

**Disproportionate Impacts of Hazardous Waste Facilities in Los Angeles County:
A Deeper Look into Immigrant Populations and the Environment**

by

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ABSTRACT

Many environmental justice studies to date have looked at the disproportionate impacts of hazardous waste facilities on different groups of people. Much of this research has focused on looking at race, income, education, housing status and other socioeconomic variables of the population. A substantial body of research has found race to be one of the strongest predictors of disproportionate environmental burden, however many of these studies do not disaggregate subgroups of minority populations, which can reveal important distinctions. This dissertation offers a new perspective on disproportionate impacts of environmental hazards by unpacking the race variable and exploring how subgroup distinctions within racial groups—such as “Hispanic” and “Asian” are potentially affected. This dissertation also examines immigrant status and assimilation and how certain characteristics of these groups such as language, foreign-born and citizenship status can affect the disparities in the location of environmental hazards in Los Angeles County. A longitudinal analysis of the demographics from the US Census from 1970-2000 surrounding the location of hazardous waste facilities in Los Angeles County was done. Whether the disparate outcomes are a result of discriminatory siting or post-siting demographic change was also analyzed for these regions. In addition to this, a typology based on socioeconomic status and foreign-born status by race was created to develop a spectrum of characteristics that are marked by each race. It was determined that Hispanic populations were on the lowest end of the spectrum with both low socioeconomic status and high foreign-born status, while the non-Hispanic white population were at the highest end of the spectrum with high socioeconomic status

and low foreign-born status. Results of the cross-sectional study showed that in Los Angeles County, the Hispanic population was the most disproportionately impacted group in 2000. From the longitudinal analysis, two conclusions were made. First, in Los Angeles County the siting of hazardous waste facilities were a result of discriminatory siting and not just post-siting demographic change. Second, there is also a shift in the racial demographic groups impacted by these environmental hazards. The results show that in 1970, facilities were sited in predominantly African American tracts while in more recent decades beginning in the 1980s and more drastically in 1990-2000, facilities were sited in predominantly Hispanic tracts marked by high levels of foreign-born and immigrant characteristics. In these latter decades facilities were sited in areas that were more Hispanic and immigrant characteristic laden as opposed to areas with a high concentration of African American populations. This may lend to the conclusion that facilities were targeting a more easily marginalized group to site their environmentally hazardous facilities. Further, this dissertation concludes that although race remains a predominant predictor of disproportionate environmental burden, race alone does not explain the whole story with respect to the disproportionate impacts of hazardous waste facilities in Los Angeles County. Subgroup differences including further marginalizing characteristics of foreign-born immigrants must be examined and taken into account.

CHAPTER ONE: INTRODUCTION

In the past several decades, the field of environmental justice research has established a relationship between socioeconomic status and the disproportionate impact of environmental hazards on marginalized populations. Much of this research has focused on race, income, education, housing status, and other socioeconomic variables. Of these, race has emerged as the strongest predictor of disproportionate burden in target communities (e.g. GAO, 1983; Bullard, 1983, 1990; UCC 1987; Bryant and Mohai 1992; Mohai and Bryant, 1992; White, 1992; Hamilton, 1993; Zimmerman, 1993; Goldman and Fitton, 1994; Pollock and Vittas 1995; Been and Gupta 1997; Boer, Pastor, Sadd and Synder 1997; Stretesky and Hogan 1998; Hunter 2000; Szasz and Mueser 2000; Pastor, Sadd and Hipp 2001; Saha and Mohai 2005; Marshall 2008; Su, et al. 2009). In a recent study, Perkins, et al. (2012) found race as a predictor of disproportionate impacts of both non-toxic solid waste and hazardous waste facilities. While a substantial body of research has demonstrated the relationship between race and the location of environmental disamenities, many of these studies do not disaggregate subgroups of minority populations, often using only the “minority” or “non-White” designation.

Given the role of race as a strong predictor of the location of environmental hazards, this dissertation offers a new perspective on disproportionate impacts by examining more than just the race variable. Specific subgroups within racial groups such as

immigrant Hispanics and Asians can produce divergent social and political outcomes leading to different levels of vulnerability in the siting of hazards and locally unwanted land uses. A recent biomedical study by Quach, et al. (2014) offers some interesting insights behind the importance of disaggregating the race variable when looking at toxic exposures. This study looked at exposures to hazardous air pollutants in California by disaggregating data on Asian American and Pacific Islander (AAPI) women and found that census tracts with aggregated AAPI groups showed little difference between tracts with non-Hispanic white women. However, disaggregated AAPI groups showed substantial difference between tracts. Their findings underscore the importance of disaggregating the heterogeneous larger racial categories to illuminate differences that may exist within the specific subgroups and their potential environmental exposures. Disaggregating the larger racial categories can highlight some of the underlying differences that are inherent amongst the divergent racial groups.

This dissertation examines immigrant status and assimilation, and how differences in the social status, political participation, and access to capital of racial subgroups may lead to different outcomes when the location of environmental hazards are examined. By exploring these subgroups and identifying specific characteristics such as language, citizenship status, upward mobility, and ethnic enclaves (places with strong bonding but weak bridging social capital ties), this study offers a deeper analysis of the ways that race underscores other social variables that may explain why some subpopulations face greater vulnerabilities related to the siting of hazardous environmental facilities than others. By examining these variables, one can further identify the underlying factors

and mechanisms that reproduce existing disparities in the location of environmental hazards.

Environmental justice research has focused limited attention on the characteristics of non-assimilated¹ foreign-born²/immigrant populations as a factor influencing disparities in siting environmental hazards. Foreign-born populations are of particular interest since non-assimilated foreign-born populations exhibit characteristics that are likely to make them more politically vulnerable and likely to be exposed to environmental hazards. Foreign-born populations that are predominantly recent immigrants³ especially have not fully integrated into mainstream American society and tend to have difficulties in learning English, finding jobs, joining mainstream civic organizations. Their intact foreign cultures function to limit assimilation in other ways. These include language barriers, non-citizenship, and dwelling in places with strong ethnic kin ties (i.e. “Chinatowns” throughout the United States), which tend to be specific to non-assimilated foreign-born populations. To date, environmental justice research has not examined these characteristics independently of race or socioeconomic status. Much early environmental justice research focused on determining whether a pattern of present-day racial and socioeconomic disparities existed. A growing body of empirical

¹ Assimilation by simple definition is where a minority group gradually adopts the customs and attitudes of a prevailing culture. Assimilated immigrant populations in the United States, would be defined as those “foreign-born” populations (defined below) that have adopted the predominant American culture, such as in social interactions, jobs, food and language. “Non-assimilated” immigrants are those that have not adopted the predominant culture and strongly hold onto the customs and culture of their home countries and are not as well incorporated in the mainstream society.

² The U.S. Census Bureau uses the term “foreign-born” to refer to anyone who is not a U.S. citizen at birth. This includes naturalized U.S. Citizens, lawful permanent residents (immigrants), temporary migrants (such as foreign students), humanitarian migrants (such as refugees), and people illegally present in the United States.

³ According to the U.S. Census Bureau’s definitions, recent immigrants are those who came to the United States within the past 10 years.

studies indicates that minority and low income groups are disproportionately burdened by environmental hazards, including large industrial facilities, waste dumps and pollution (e.g. GAO, 1983; Bullard, 1983, 1990; UCC 1987; Bryant and Mohai 1992; Mohai and Bryant, 1992; White, 1992; Hamilton, 1993; Zimmerman, 1993; Goldman and Fitton, 1994; Pollock and Vittas 1995; Been and Gupta 1997; Boer, Pastor, Sadd and Synder 1997; Stretesky and Hogan 1998; Hunter 2000; Szasz and Mueser 2000; Pastor, Sadd and Hipp 2001; Saha and Mohai 2005; Taylor 2014).

Others have attempted to investigate the processes by which disparate conditions have arisen and have hence tried to tackle the questions relating to the temporal sequence of events leading to disparities (which came first, the people or the pollution?) (Been 1994; Been and Gupta 1997; Hamilton 1993, 1995; Kreig 1995; Oakes, Anderton and Anderson 1996; Stretesky and Hogan 1998; Pastor, Sadd and Hipp 2001). These studies have found larger proportions of minority and low-income populations in close proximity to environmental pollutants, relative to the majority white and affluent populations. A range of theoretical explanations for such distributional inequities has been offered, involving economic, sociopolitical and racial factors (Mohai and Saha 1994; Saha and Mohai 2005; Mohai and Saha 2006, 2007; Taylor 2014). These factors have been used in efforts to explain two general processes that can result in a disproportionate number of racial minorities and low-income populations in close proximity to environmentally hazardous facilities. These processes are: 1) disproportionate siting, which refers to the placement of hazardous facilities in communities with significantly higher proportions of racial minorities and low income groups at the time of siting, and 2) post-siting demographic change, which refers to the

demographic changes that can occur after the siting of facilities which can account for present day racial and socioeconomic disparities in the distribution of environmental hazards (Saha and Mohai 2005; Mohai and Saha 2006, 2007; Taylor 2014). The following is a brief discussion of these factors, and will be explored in greater detail in the theoretical section of this dissertation.

Economic factors influence environmental inequities due to financial and income-related reasons for the location of environmental hazards. Financial considerations can attract facilities looking to cut costs by locating in areas with low land values and low labor and operational costs, and can simultaneously influence where low income minorities' choose to reside due to economic constraints. The role of economic factors explaining disproportionate siting focus on racial and socioeconomic disparities at the time of siting have been previously examined by various groups (UCC1987; Been 1994; Mohai and Bryant 1992; Hamilton 1993, 1995; Taylor 2014). For instance, a 1983 publication by the sociologist Robert Bullard argued that siting in Houston was located near primarily Black neighborhoods and schools even though Blacks composed only 27.6% of the city's population at the time of the study. (Taylor 2014). Research focusing on economic factors influencing disproportionate post-siting demographic changes suggests that the existence of environmentally hazardous facilities will adversely impact a neighborhood by economically downgrading the area. As a result, the existing non-minority, more affluent populations will tend to move out of these economically depressed areas while minority or low-income populations will tend to move in. These areas become even more impoverished due to such demographic shifts and the housing market (Been 1994; Hamilton 1995; Taylor 2014). Low-cost

lands attract industries as well as the poor (Taylor 2014). Concurrently, studies such as Nelson, Genereux, and Genereux (1992) show a property value gradient of 6.2% per mile, with the lowest property value within a two-mile radius of landfills (Taylor 2014). Home prices close to sites noticeably depreciate before these sites are placed on the Superfund list. After the closing, evaluation, and cleanup, property values may increase, such as in Monterey Park (10 miles east from Los Angeles), but may not always increase (McMillen and Thorsnes 2003; Hurd 2002; Aydin and Smith 2008; Taylor 2014). Hurd (2002) demonstrates how property near hazardous waste sites can recover value through time simply based on perceptions that the site is, or expected to be cleaned up.

Sociopolitical factors involve the lack of social capital and political empowerment in the communities, which affect their ability to successfully mobilize as a group and ward off the placement of environmental hazards in their neighborhoods. Gayer (2002) observed that income, level of education, and racial composition of the neighborhood influenced the tradeoff of professed health risks from hazardous sites and housing prices. Gayer found that this risk tradeoff was \$582 more for a home in a neighborhood with higher percentage of college-educated residents, \$270 for a home in a high-income neighborhood, while \$155 less in a neighborhood with a large portion of minorities (Gayer 2002; Taylor 2014.) Hamilton's study in 1993, and later in 1995 showed that race was a significant variable in determining processing capacity and pollution output of a site (Hamilton 1993,1995; Taylor 2014). Coupled with ethnic churning, these groups tend to lack collective efficacy and are prone to being targeted as marginalized groups becoming the "path of least resistance." The "path of least resistance" argument claims

disproportionate siting is a result of this populations lack of ability to influence siting decisions and effectively organize public opposition (Cerrell Associates 1984; Grossman 1991; Bullard 1990, 1993; Mohai and Bryant 1992; Pastor, Sadd, and Hipp (2001); Saha and Mohai 2005, Taylor 2014).

The existing legal and regulatory context in which siting decisions are made may also contribute to disproportionate siting. Sociopolitical explanations account for post-siting demographic change through social processes of neighborhood decline or lack of political power in host neighborhoods contributing to post-siting downgrading (Bullard 1983, 1990; UCC 1987; Grossman 1991; Mohai and Bryant 1992; Hamilton 1993, 1995; Pulido 1996, 2000; Saha and Mohai 2005), creating undesirable areas.

Racial factors are based on the role that race plays in discriminatory practices in both environmental siting and the housing market. The effects of race on unequal treatment and outcomes manifest themselves through the social stigmas and prejudiced attitudes that, when applied to certain racial groups, inevitably cause many racial minorities to be discriminated against. However racial discrimination occurs not only through prejudiced beliefs and social stigma, but occurs through both direct and indirect forms of discrimination in the siting process (Feagin and Feagin 1986). For example, siting a facility in areas with low housing and labor costs may invariably result in the selection of minority communities as host communities. However, the location of the communities and the demographic characteristics of communities may be a function of due discrimination that minorities face in the housing and labor markets—a form of indirect discrimination (Taylor 2014). Racial factors can also influence post-siting demographic changes due to discriminatory housing practices that occur after siting

which prevent minorities, regardless of financial ability, to relocate to a better area (Feagin and Feagin 1986; Massey and Denton 1988; Bullard and Feagin 1991; Mohai and Bryant 1992; Been 1994).

These theoretical explanations have provided important insights into how environmental disparities may occur. The people most likely to be exposed to environmental hazards have been low-income, disempowered and/or racial minority groups. However, this explanation does not consider how exposure to hazards is related to immigrant or non-assimilated status.

Since 1970, the foreign-born population of the United States has increased rapidly due to large-scale immigration, primarily from Latin America and Asia (Gibson 1999). According to the American Community Survey (ACS) issued by the US Census Bureau, in 2010, the estimated number of foreign-born in the United States is nearly 40 million or 13 percent of the total population (Grieco et al. 2010). With this large number of recent immigrants living in the United States, the immigrant population is both a rich, diversely nuanced, and poorly understood demographic with respect to environmental disparities. Aspects of the immigrant experience—language barriers, citizenship status, upward mobility barriers, and ethnic enclaves, among others, shape the experiences of foreign-born populations, yet do not fall neatly within the typical understandings of the economic, sociopolitical or racial explanations.

There are important similarities and differences between immigrant populations and other disproportionately burdened minority groups. Environmental equity research related to the foreign-born populations is important not only because many immigrants to the United States are socio-economically similar to native-born minority group

members, but also because there are additional factors unique to immigrants that shape their experience. According to the ACS, of the nearly 40 million foreign-born in the United States, in 2010, over half lived in just four states: California, New York, Texas and Florida (Grieco, et al.2012). Among these states, California houses the largest number of foreign-born at 27 percent. Since 1970, the foreign-born population of the United States has increased rapidly due to large-scale immigration, primarily from Latin America and Asia (Gibson 1999).

From the theoretical vantage point of immigrant assimilation studies, immigrants are distinct in that they bring many social characteristics with them influenced by their original culture; from class, education, occupations, to cultural values that have bearing on their experiences in America. Their outcomes in American society therefore, are influenced in part by those initial resources brought from their country of origin (Pedraza-Bailey 1990, p. 49). However, a number of other factors can adversely impact immigrant populations and their societal well-being. Such factors can include: 1) “Language”—language barriers and the inability to speak the lingua franca of the dominant society; 2) “Citizenship”—the lack of political clout resulting from the lack of political representation as well as the lack of voting rights by not being naturalized citizens; 3) “Low Upward Mobility”—the lack of social assets such as entrepreneurial know-how, and access to jobs and information networks that are integral to upward mobility likely due to the fact that they have moved from their home countries into a new, foreign country and culture ; 4) “Ethnic enclaves”—the differing push and pull factors driving migration, especially kin-based migration, producing a tendency of immigrants to dwell in residential clusters dominated by their own cultural group,

otherwise known as “ethnic enclaves.” The social context that greets new immigrants, namely the amount of opportunity available to them in the new society, is key to their social, economic, and political outcomes (Pedraza-Bailey 1990, p.49).

All four of these factors are related to assimilation. However, the first two factors, language and citizenship in particular, may explain why immigrants might lack the ability to have a voice in decision-making and mobilize as a group. This is relevant to environmental justice issues, as it might explain why immigrants as a group may be unable to engage in advocacy to protect themselves from exposure to environmental hazards. Although these factors may appear to be closely related to sociopolitical explanations such as the lack of social capital or political efficacy, language and citizenship status barriers that immigrant groups experience have implications for additional layers of disadvantage (Taylor 2014). For instance, in the siting of new facilities, language barriers prevent many immigrant groups from even knowing that there are plans for facility siting in their neighborhoods, as many of these notices are commonly not in a language they can understand (Austin and Schill 1991; Hunter 2000). Even if they are aware of an impending siting, their inability to effectively communicate in the dominant language and their lack of representation or allies in governmental positions may strongly deter public opposition to prospective facility siting in their neighborhoods (Taylor 2014). Lack of citizenship status not only impact assimilation of immigrant groups, but reduces immigrants’ abilities to be politically involved. Voting, one of the most basic forms of political engagement of citizens is, by law, not available to immigrants who have not been naturalized as citizens. By extension, lack of citizenship and ability to vote often leads to lack of civic involvement.

This further impacts the mobilization of opposition and advocacy to prevent siting of environmental hazards.

Unassimilated immigrant groups are also made up of a large number of unauthorized migrants living in the United States. Although these groups are quite difficult to study in quantitative research, which uses national datasets such as the US Census, we cannot discount the existence of the undocumented groups that make up a large part of the unassimilated immigrant populations. Passel (2006) did an extensive study of the unauthorized migrant population in the US and found that according to the March 2005 Current Population Survey, 11.1 million unauthorized migrants were in the United States a year ago. This study also showed that two-thirds (66%) of the unauthorized population had been in the country for ten years or less, and the largest share, 40% of the total or 4.4 million had been in the country five years or less (Passel 2006). Unauthorized migrants are likely to make up a large percentage of the unassimilated immigrant population as a whole. However since they are undocumented, they are not accounted for in the census data used in this dissertation. Due to this, we may be able to deduce that results obtained from this study can further be magnified had the unauthorized migrants were added in.

The next two factors, low upward mobility and ethnic enclaves, are social dynamics that generate and perpetuate immigrant populations' residential segregation that increase their likelihood of frequently living in areas with high levels of environmental burdens. Non-assimilated immigrant groups, whether due to their lack of ability to communicate in English, fundamental labor market skills due to a lack of education in the U.S., or access to mainstream social networks, they often rely heavily

on their kin-based networks for jobs and social ties. Consequently, a stronger affinity towards the home culture occurs and assimilation into the dominant culture is stunted, leading to residence in ethnic enclaves. Such immigrants may opt not to object or to move out when their host neighborhoods are threatened by environmental hazards. Immigrant populations may choose to keep living in their ethnic enclaves even in the face of adverse economic conditions (i.e. rent increases) or the presence of polluting facilities, generating post-siting demographic change (i.e. minorities move into an area with polluting facilities). These dynamics are related to ethnic social disadvantages, and linked to sociopolitical or even racial explanations for post-siting demographic characteristics. However, non-assimilated immigrant populations may continue to remain in and enter these ethnic neighborhoods not because of a lack of choice due to housing discrimination, or because their incomes are too low to afford to live elsewhere, but because they choose to be there for cultural kin based reasons. These are assimilation-based explanations for both disproportionate siting and post-siting demographic change.

These dynamics, which tend to be specific to non-assimilated foreign-born immigrant populations, illuminate dimensions of social marginalization and disadvantage that may impinge on their presence in neighborhoods that are affected by environmental disparities. This dissertation focuses on these dimensions of marginalization unique to non-assimilated immigrant populations in their relation to environmental disparities. Prior research on environmental disparities may have glossed over these disadvantages in considering the race variable as a singular, undifferentiated “non-white” category. This study seeks to examine how these

neglected factors contribute to our understanding of how race and class influence environmental disparities.

1-1 Study Aim

This dissertation contributes to the prior theoretical explanations of environmental inequalities by focusing on disadvantages that are unique to immigrant populations. Previous theories explain environmental disparities by examining the siting of hazardous waste facilities near impoverished and minority neighborhoods, as well as the process of demographic shifts that occurs around existing hazardous waste facilities (Taylor 2014). This project contributes to the theories discussed at length by Taylor (2014) by a deeper examination of economic, sociopolitical and racial explanations for disparities in both siting and post-siting demographic change. These three categories of explanations may not address the full range of processes by which non-assimilated immigrant groups become disproportionately affected environmental disamenities (Taylor 2014). There is little in the existing research literature that examines variables other than race and socioeconomic factors, and even fewer studies that parse out specific assimilation related characteristics of immigrant populations from larger racial or socioeconomic factors that explain environmental disparities.

To date there is only one major study by Lori Hunter (2000) specifically focusing on immigrant populations and environmental hazards. Hunter's study is a good starting point for examining the burden of environmental disamenities on immigrant populations. However, this study has a number of methodological and conceptual limitations. Methodologically, this study uses county-level data in its analysis of minority

characteristics, creating a risk of aggregation error, since significant differences can occur between areas within a single county. Most significantly, Hunter does not conceptually disaggregate native-born and foreign-born members of the same minority group in her analysis. Rather, her study states that foreign-born and native-born minorities both hold similar characteristics, thus resulting in foreign-born minorities experiencing the same disproportionate environmental risks as native-born minorities. This assumption in her study fails to address the possibility that there may be characteristics unique to immigrant populations not shared by native-born minorities, and that these unique characteristics may indicate disadvantages that immigrant populations experience. Such characteristics may be significant variables that are driving immigrant populations' disproportionate burden of environmental harm. This is where Hunter's (2000) study warrants further exploration. Other than Hunter (2000) there are no other studies that have specifically examined immigrant populations' experience with environmental disparities⁴.

This research is particularly relevant given the increase in the foreign-born immigrant population in the United States, and accordingly, the rise in populations with characteristics common in many immigrant populations such as limited English proficiency, lack of citizenship and voting status, cultural non-assimilation, and lack of educational capital required to negotiate the labor market. As the population of foreign-born individuals increases, it becomes accordingly important to investigate the influence of the characteristics of non-assimilated foreign-born populations on their exposure to hazards. It is possible that non-assimilated populations may be even more socially

⁴ In order to confirm this claim, Dr. Hunter was contacted with respect to this topic and she also confirmed that there are no other published works on this specific subject at this current time.

marginalized in the U.S. than those who are only members of racial minority or low-income groups. The “path of least resistance” argument, which suggests that environmental inequalities arise because of low-income and minority communities lacking the power to influence siting decisions (Bullard 1983, 1990), would predict that non-assimilated foreign-born populations would be even more vulnerable to such disparities due to their increased marginalization as a result of their non-assimilation.

The lack of research on foreign-born populations with respect to their exposure to environmental hazards highlights the importance of this dissertation research. This study aims to address this gap in current environmental justice research and explore, in greater depth, the economic, racial, and sociopolitical explanations for inequities in the distribution of commercial hazardous waste facilities and the patterns in the distribution of environmental hazards with respect to the location of immigrant populations. It seeks to contribute to theoretical perspectives in environmental justice by identifying additional, not previously examined, factors that may help to explain disparities in the location of environmental hazards.

1-2 Research Questions

The purpose of this research is to determine the extent to which the characteristics of foreign-born populations relate to the distribution of environmental inequalities. The research seeks to develop a new theoretical perspective to help explain factors behind environmental disparities that are not fully explained by the existing environmental justice literature.

This dissertation seeks to advance environmental justice research by addressing four main research questions:

- 1) Do environmental inequalities exist in immigrant communities?
 - a. Are foreign-born populations more likely to live near environmental hazards than native-born residents?
- 2) What characteristics of immigrant populations are associated with a greater likelihood of living near environmental hazards than native-born populations?
 - a. Are non-English speaking populations more likely to live near environmental hazards than English-speaking populations?
 - b. Are non-U.S. citizens more likely to live near environmental hazards than U.S. Citizens?
 - c. Are foreign-born populations with lower socioeconomic status (i.e. low income, working class occupations, low educational attainment) more likely to live near environmental hazards than foreign-born residents of higher socioeconomic status?
- 3) Currently, do non-assimilated immigrant groups have characteristics that make them more socially marginalized than non-immigrant racial minorities or low-income populations, thereby increasing their likelihood of becoming the “path of least resistance” for hazards?
 - a. Do racial minorities who are non-assimilated immigrants have a greater likelihood of living near environmental hazards than racial minorities that are either native-born or immigrants who are assimilated?

- b. Do low socioeconomic status populations who are non-assimilated immigrants experience a greater burden of environmental hazards than low socioeconomic status populations who are either native-born racial minorities or assimilated immigrants?
- 4) Are environmental disparities in Los Angeles County a result of disproportionate siting or post-siting demographic change?
 - a. Were hazardous waste facilities in Los Angeles County sited in areas whose populations were already predominantly minority, lower-income, and/or immigrant?
 - b. Did minority, lower-income and/or predominantly immigrant populations move into areas that already had existing hazardous waste facilities in Los Angeles County?

1-3 Study Design and Chapter Organization

The main purpose of this study is to add to the existing scholarship on environmental disparities in the United States by focusing on the possible effects, or added effects, of the disadvantaging effects of non-assimilation on immigrant populations' likelihood of exposure to environmental hazards. This study relies on data from the United States Census for the years 1970-2010 and Treatment, Storage, and Disposal Facilities (TSDF) data. Census variables such as foreign-born status, English language proficiency, citizenship status, occupational status, and educational attainment will be analyzed in relation to the location of hazardous waste facilities in the area of study. Language, citizenship and foreign-born status variables will be used as proxies

for low-assimilation characteristics that are often found in immigrant populations. These variables will be used to examine whether differences in the distributional burden of hazardous waste facilities exist between non-assimilated immigrant racial minorities versus racial minorities who are either assimilated or are non-immigrants. In order to look deeper into regions with high minority concentrations by a given subgroup, the data will be divided by isolating census tracts that are at least 50% of one race. The demographics of these isolated census tracts will be analyzed using descriptive statistics. These regions will be historically examined through longitudinal analyses of the 1970, 1980, 1990, and 2000 Censuses in order to determine the persistence and growth of the ethnic demographic population concentration. This data will then be analyzed in comparison with the siting of commercial hazardous waste facilities to assess whether disproportionate siting or post-siting demographic change accounts for a greater extent of the demographic distribution with respect to the location of waste sites.

The commercial waste facility data for this research was compiled using data from multiple discrete databases that were further verified, aggregated and synthesized into a single data set. These source databases were used in prior research studies, and will be described more fully in the chapter on methods. This research study will focus specifically on Los Angeles County, California in order to facilitate a closer look at racial minority subgroups. Los Angeles County was selected because it is the most ethnically diverse region in the United States, with the largest populations of racial and ethnic minority groups. Los Angeles County has larger proportions and higher concentrations of racial and ethnic minority populations that are too small elsewhere in the U.S. to have

a significant impact on research outcomes. The selection of Los Angeles County also facilitates the study's aim to probe deeper into the relationship of immigrant populations and environmental disparities by focusing on specific minority subgroup populations, rather than more broad racial minority categories. Although a longitudinal study examining change over time in variables related to immigrant status would have been ideal, this was not feasible because the census variables of interest for such a study are only available for the 2000 Census and only a limited number of variables for the 2010 Census; hence, data for these variables could not be compared across all the time periods of interest.

For Los Angeles County, data will be examined at the census tract level, and both spatial analysis and statistical analyses will be used to determine the impact of immigrant-related variables on outcomes of disproportionate environmental burden. Geographic Information Systems (GIS) will be the main application by which spatial analysis will be performed, and this software will facilitate our ability to more accurately research and analyze the characteristics of the areas that are geographically proximate to hazardous waste facilities. This study uses the distance-based method wherein the exact locations of hazardous waste facilities are mapped, more accurately controlling for the distances from the facilities to nearby populations. The analytical methods used in this study involve cross sectional analyses involving descriptive statistics employing independent sample t-tests, bivariate correlations, multi-variate analyses employing logistic regression.

This dissertation is divided into nine chapters. The chapters are designated as follows: Chapter 1 is the introduction and provides the general background of the study,

giving a brief, macroscopic overview of the research questions, study aim, design and the study objectives and design. Chapter 2 reviews the environmental justice literature on facility siting from its nascent state to its current state, focusing on the salient empirical studies on issues of disparities in the location of hazardous waste facilities both in Los Angeles and other areas in the United States. Chapter 3 discusses the immigration sociology literature that covers the history of different groups' immigration into the United States and the theories behind the divergent assimilation patterns of these different immigrant groups. Chapter 4 presents the theoretical framework of the study, including the theoretical arguments behind the research questions and hypotheses for the study. Chapter 5 is the methods section that will discuss the methodology employed in this dissertation. Chapter 6 is the first results and discussion section and will present the results of the descriptive statistics of the neighborhoods surrounding hazardous waste facilities according to the 2000 Census. It will also provide a detailed analysis of the demographics of the neighborhoods by analyzing their socioeconomic and immigrant vulnerability by racial subgroup concentrations. Chapter 7 is the second results and discussion section that examines the cross-sectional assessment of present day disparities based on racial, socioeconomic and immigrant vulnerability of neighborhoods with hazardous waste facilities. Chapter 8 is the third results and discussion section that examines the longitudinal analysis of racial, socioeconomic and immigrant vulnerability of neighborhoods containing a hazardous waste facility for four decades from 1980 to 2010. Finally, Chapter 9 is the concluding chapter that summarizes the study's major findings, discusses its limitations and offers suggestions for future research to further building on the findings of this research.

CHAPTER TWO: **ENVIRONMENTAL JUSTICE AND ENVIRONMENTAL INEQUALITY: A REVIEW OF THE LITERATURE**

The contemporary environmental justice movement arose and generated widespread public attention largely in the 1980s and 1990s, covering a range of issues which included not only facility siting, but also occupational hazards, exposure to pollution, lack of access to open space, segregation, and unequal transportations. Notably for facility siting, grassroots protests arose over the placement of polluting facilities in predominantly African American, Native American and Latino communities (Bryant and Mohai 1992; Bullard 1983, 1990; Bullard and Wright 1987; Cable and Benson 1993; Capek 1993). The environmental justice movement has been further labeled to be a recent development of environmentalism in the United States that wed environmentalism and civil rights (Pulido 1996). Contained under this umbrella are various issues concerning the possible intentional siting of Treatment, Storage, and Disposal Facilities (TSDFs) of hazardous waste, landfills, incinerators, and other polluting industries in communities inhabited mainly by racial minorities and the working poor. Empirical research has supported claims that minority and low income communities are not able to enjoy the same degree of environmental quality as other members of society (Austin and Schill 1991; Cole 1992; Bryant and Mohai 1992; Mohai and Bryant 1992; Goldman 1993, 1994; Taylor 1993; Brown 1995; Rinquist 2005; Mohai and Saha 2006).

Although academic interest has existed for some time, public attention to the issue of disproportionate social distribution of environmental hazards was brought about by well-publicized protests in an African American community in Warren County, North Carolina over a state proposal to locate a polychlorinated biphenyl (PCB) landfill there (Mohai and Bryant 1992). These protests led to a 1983 study conducted by the General Accounting Office where it was found that three out of four communities around certain hazardous waste landfills in the South were predominantly African American and that all were disproportionately poor (GAO 1983). Several years later the first nationwide analysis was undertaken by the United Church of Christ Commission for Racial Justice, commissioned in part because of the Warren County protests (1987) and it was found that the percentage of minority people in zip codes with a commercial hazardous waste facility was twice that of other zip codes. Further, this study revealed that there was a positive relationship between the concentration of minority and low-income residences and proximate hazardous waste facilities and while controlling for other variables, race was found to be an independent predictor of locations of TSDFs (UCC 1987).

Academic research on such inequalities in the distribution of environmental hazards was rekindled and flourished in the wake of the UCC report. In 1992 Mohai and Bryant (1992) conducted a study in Detroit, Michigan, and found an increased likelihood of minorities and the poor in areas closer to hazardous waste facilities. Their study concluded that the results “provide clear and unequivocal evidence that income and racial biases in the distribution of environmental hazards exist” (Mohai and Bryant 1992:174). In a more recent study, Mohai and Saha (2007) have found that the magnitude of racial disparities around hazardous waste facilities are much greater than

what prior studies have reported and even after controlling for economic and sociopolitical variables. Thus, factors uniquely associated with race appear to be associated with the disparities in the location of hazardous waste facilities. Much of the existing research has found that persons of color and the poor are disproportionately burdened by various environmental hazards from air and water pollution to contaminated home and workplace areas (e.g. Asch and Senaca 1978; US GAO 1983; UCC 1987; Bullard 1990; Mohai and Bryant 1992; Wright 1992; Bullard 1993; Hamilton 1993; Goldman and Fitton 1994; Brown 1995; Been 1995; Ringquist 2005; Marshall 2008; Su, et al. 2009; Chakraborty 2012).

In the mid 1990s, however, the findings of the UCC and earlier studies began to be challenged and scholars began raising doubts about the validity of the existing research methodology (Anderton et al. 1994; Been 1995; Glickman and Hersh 1995; Krieg 1998; Mohai 1995; Mohai and Saha 2006; Pollack and Vittas 1995; Sheppard et al. 1999) as well as questioning the nature and process by which present-day disparities developed (Been 1994; Been and Gupta 1997; Oakes et al. 1996; Pastor et. al 2001; Saha and Mohai 2005). Apart from some of the findings in earlier work where minority neighborhoods were found to host a disproportionate share of the environmental hazards and toxins produced by an industrialized society, some researchers found that race was not a statistically significant predictor when looking at locational disparity of TSDFs (Anderton et al. 1994).

Researchers at the Social and Demographic Research Institute (SADRI) at the University of Massachusetts found little difference in the minority percentages between tracts containing commercial hazardous waste facilities versus those without (Anderton

et al. 1994; Oakes et al. 1996; Davidson and Anderton 2000). With the UCC study as a base, Anderton et al. (1994) replicated the study by using census tracts as the unit of analysis instead of zip codes. They claimed that the smaller unit of analysis used in their study was better than that of the UCC study since the smaller units involved less aggregation errors. However, the Anderton (1994) studies were criticized for their methodological issues, particularly in the exclusion of certain areas from their analysis (see Been 1995; Bullard 1996; Mohai 1995) as well as flaws in their approach. The University of Massachusetts group identified a tract containing the hazard as the “host” tract and simply compared the demographic characteristics of the host and non host tracts, which ignores the fact that there often are people living in non host tracts that are closer to the hazard than non host tracts (Mohai and Saha 2006). For instance, if the facility was right at the border of a large census tract (many square miles in area), the population of an abutting census tract directly next to the facility may be more highly impacted than the populations inhabiting the host tract itself if they were many miles away from the location of the facility. Nevertheless, Anderton et al. (1994)’s study was one of the first major studies that concluded that race, namely African Americans and Hispanics, was not a significant predictor in the location of TSDFs within census tracts but rather “the percent of persons employed in manufacturing occupations” is a significant predictor of whether census tracts hosted at least one TSDF.

Another study with similar conclusions was Klein and Chandler (1996), which claimed their study of environmental hazards in Indiana casted doubt on the validity of earlier studies that supported assertions of environmental inequity or racism. They found that persons living in close proximity to the sites had household incomes

indicating these people could move easily if they wanted to. The researchers also asserted that racial bias was not a factor in siting (Klein and Chandler, 1996). It is interesting to see what sorts of ethnic subgroups resided in these areas and namely if any of the observed outcomes were a result of ethnic enclaves or other foreign-born based characteristics that were not looked at by Klein and Chandler.

Anderton's (1994) and such studies debunking theories of environmental inequities and environmental racism, sparked much debate as this conclusion contradicted many of the findings from not only the prior studies but results of other studies published around the same time. Goldman and Fitton (1994), for example, updated the UCC study and their conclusions reaffirming the UCC study's conclusion that an area's minority percentage increases along with the concentration of TSDFs. Subsequent studies followed with similar results to the UCC study, including those that more critically examined issues of the existing research methodology (e.g. Been 2005; Mohai 1995; Mohai and Saha 2006; Pollack and Vittas 1995; Sheppard et al. 1999). Such studies, comprising more of the recent wave of research, have therefore tended to confirm outcomes of racial disproportionality in line with the earlier findings (e.g. Been 1994; Been 1995; Mohai and Bryant 1992; Hamilton 1995; Pollock and Vittas 1995; Been and Gupta 1997; Boer et. al., 1997; Hird and Reese, 1998; Boone and Modarres, 1999; Lejano and Iseki, 2001; Pastor et al. 2001; Pastor et al. 2004; Ringquist 2005). Ringquist's (2005) study offers one of the most recent reviews of empirical environmental equity studies and finds that there is much evidence of environmental inequities based on race. While recent research such as Taylor (2014) investigates

inequities with respect to economic class, the groups need to be further defined and evaluated.

Recent research in environmental disparities in California is reflective of environmental inequity based on race. Lejano and Iseki (2001), in their study of Los Angeles County, looked at the frequency of hazardous waste facilities at the zip code level and examined racial composition while controlling for socioeconomic characteristics. This study found significant correlations between the incidence of hazardous waste facilities (TSDs) and certain demographic variables. In particular, they found hazardous waste siting to be most highly related to the location of Latino communities (Lejano and Iseki 2001). Boer et al. (1997), Sadd et al. (1999), Pastor et al. (2001) and Morrello-Frosch et al. (2001) have found consistent associations between the percent of minority populations and environmental hazards with the multiple-variable approach where it was found that race mattered even after controlling for other variables such as population density, urbanization and other socioeconomic variables. Boer et al., 1997 and Sadd et al., 1999 looked at the distribution of hazardous waste storage and disposal facilities as well as toxic air releases in Southern California and found strong evidence of a racial pattern while controlling for other variables such as income, land use and employment. From this study, they established that hazardous waste facilities were concentrated in minority communities in metropolitan areas around California. Morello-Frosch, Pastor and Sadd (2001) looked at air toxins of all types in Southern California in relation to cancer risk over an individual lifetime and mapped this against ethnicity. They found that racial differentials existed and continued to exist even after an increase in the area household income. They performed regression analyses

controlling for population density, economic factors and the percent of land devoted to industrial, commercial and transportation purposes and found that race was still significantly associated with higher levels of estimated risk (Morello-Frosch et al. 2001). Also, Mohai and Saha (2006, 2007) show that race tends to be a more influential variable in multivariate analyses when more methodologically sound distance-based methods are used, as opposed to the unit-hazard coincidence method in environmental equity research.

Another debated issue in the environmental justice literature is the "chicken or egg" question of which came first – the facilities or the people. This question asks if environmental disparities occur as a result of discriminatory siting at the time of siting or through socio-demographic composition change after the introduction of polluting facilities to an area (i.e. Pastor et al. 2001).

Pastor et al. (2001)'s study tried to disentangle the disproportionate siting versus minority move-in hypothesis by charting the arrival of TSDFs against changing neighborhood composition in Los Angeles County. They looked at the characteristics of an area prior to siting and the demographic and other shifts that occurred in the years after siting and were able to find strong evidence of discriminatory siting.

Unlike many of the studies that look at the distribution of environmental hazards as a "snapshot in time" of cross-sectional studies, this study effectively addresses the prime question of what came first, the people or the facilities, by conducting a thorough longitudinal study from 1970-1990 and tracking the location and siting dates of all TSDFs in Los Angeles County. They countered existing arguments such as Been and Gupta (1997), which suggests that disproportionate exposure is simply a reflection of

the market where both minorities and undesirable land uses will be attracted to areas with lower housing values and also that minorities may move in after the arrival of a new environmental hazard by the hazardous facility lowering land values. The results of the Pastor et al. (2001) longitudinal study were that discriminating siting matters more than minority move-in around a hazardous waste facility. Not only did the demographic variables matter more to the future siting of a TSDF, but the study also found that waste facility siting had an effect in repelling rather than attracting minorities. (i.e. minorities move out of such neighborhoods) Therefore Pastor et al (2001) found that TSDFs were sited in areas with high numbers of minorities rather than minorities settling to areas with already housing TSDFs. Studies such as this targeted the criticism of simply equating the positive correlation of two variables—minority presence and toxic facility presence to be sufficient in suggesting the existence of environmental discrimination at the time of siting. Pastor et al. (2001) also suggested that social capital was stronger in communities with less ethnic churning. Ethnic churning is defined as the replacement of one ethnic group with another within a given community. They argue that the result of this ethnic churning is a weakening of the usual social bonds solidified by ethnicity and strong cultural ties and make an area more susceptible to siting of toxic land uses. Their findings indicated that ethnic churning in Los Angeles was associated with the siting of hazardous waste facilities over a two-decade period after adjusting for economic factors (Pastor et al. 2001).

In a more recent study exploring the chicken or egg hypothesis, Campbell et al. (2010), looked at Toxics Release Inventory (TRI) facility data and census data for three decades from 1980-2000 in Maricopa County, Arizona. They found that controlling for

the populations present at the time of disamenity location by using a longitudinal data set, they found evidence that facility siting was correlated with the race/ethnicity of the neighborhoods (Campbell et al. 2010)

Saha and Mohai (2005) also provide evidence of disparate siting of hazardous waste facilities. This study performed a longitudinal analysis in the state of Michigan from 1950 to 1990 and revealed a distinct temporal pattern supporting the hypothesis of environmental discrimination at the time of siting. They look at the historical context and siting of hazardous waste facilities in Michigan to find that environmental inequity in the siting of hazards emerged during the 1970s with the Not In My Back Yard (NIMBY) movement where people became increasingly concerned with environmental hazards and those that were aware of the impacts made took measures to keep these facilities out of their neighborhoods. Racial and economic disparities in the distribution of environmental hazards intensified because new hazardous waste facilities followed the “path of least resistance” toward minority and poor neighborhoods (Saha and Mohai 2005). Initially, in the 1950s and 1960s when hazardous waste facilities were not perceived as a threat by many communities but more so as a reflection of economic growth, it was found that these facilities were placed in predominantly white, middle-class neighborhoods with little concern on the health burdens. By the 1970s, the health risks associated with toxic wastes and environmental hazards were more widely recognized and protests by grassroots white and middle-class activists made the siting of these facilities in their communities much more difficult. These protests changed the landscape of the spatial distribution of the environmental hazards as the opposition from white middle-class communities caused the facility burdens to be shifted to minority and

poorer communities. The industries at the time held the conception that poor and minority communities did not care about the environment but this stereotype was later found to be misguided as some of the newer burdened minority groups started to organize their own grassroots opposition as well (Bullard 1990, 1999; Taylor 2000). Saha and Mohai (2005) conclude in their study that discriminatory siting practices are not going to disappear anytime soon. They also claim that as long as the most polluted and disempowered communities exist and remain as paths of least resistance, “attention to post-siting neighborhood changes that may exacerbate siting disparities might only serve as a diversion” from the larger issue of institutional discrimination that are underlying facets in industries’ and government’s siting decisions (Saha and Mohai 2005). Taylor (2009) further provides evidence that such hazardous facilities were being placed in minority communities as early as the 19th century.

This “path of least resistance” argument involves issues caused by low levels of political power in minority communities that may cause facilities to locate into these marginalized areas. The underlying theory driving the political disempowerment has to do with notions of social capital and the lack of community efficacy (Hamilton 1995; Pastor et al. 2001; Schelley and Stretesky 2009)

Community efficacy involves residents’ ability to organize and affect policy. The higher a communities’ collective social status, their income or race, the more effectively they can resist the placement of environmental hazards in their neighborhoods. Environmental justice activism rides on this notion where there is a call to encourage “active community participation, institutionalize public participation, recognize community knowledge and utilize cross-cultural formats and chances to enable the

participation of as much diversity as exists in a community” (Schlosberg 2007, p 67).

The lack of such participation is what we see with a lack of social capital and community efficacy where there are limitations from race, class or social status that pose a range of structural obstacles such as less access to political, legal, scientific and economic resources necessary for full participation in environmental decisions (Schlosberg 2007, p 68). This falls under the “socio-political explanations” of environmental inequities discussed in greater detail in the subsequent paragraphs following.

Zahran et al. (2008) conducted a study, among other variables, looking at civic vitality and the distribution of TSDFs in the Southeast and found that civic capital rate is statistically significant with the measure of environmental risk. They reason that commercial TSDFs appear to avoid neighborhoods with stronger than average potential for collective action (Zahran et al. 2008 p 193). Their measure for civic capital was looking at the “Total assets of non-profit organizations as inventoried by the National Center of Charitable Statistics in a census tract area” (Zahran et al. 2008 p. 188). The researchers say that voluntary associations and nonprofit organizations appear to matter in the regional patterning of environmental risks and that NIMBY movements are more likely to come about within civically organized communities to target TSDF regulators in their rational to take the “path of least resistance.”

In one of the most recent studies, Schelly and Stretesky (2009) conducted an analysis of the “path of least resistance” argument using three monumental environmental justice success cases: the Shintech case, the Louisiana Energy Services (LES) case, and the Select Steel case. These three cases are considered successes in that each accounts for a situation where the siting of a hazardous waste

facility was either thwarted to another area or halted due to the success of grassroots movements and protest. They geographically mapped the location of these three facilities' proposed siting regions and the actual siting regions to compare and contrast the demographic data of the areas. In the Shintech case, the citizens of Convent, Louisiana fought heavily to keep a polyvinyl chloride (PVC) manufacturing plant out of their town and successfully had the facility relocated to another region. In the LES case, severe opposition from local residents in Homer, Louisiana thwarted the facility location to Eunice, New Mexico. Select Steel had tried to build a steel mini-mill in Flint, Michigan, but the community protests had caused Select Steel to abandon their plans to build the steel mill in Flint and find an alternative location in Michigan to build, and it appeared they ended up not pursuing the project. Later it was found that the siting of the steel mill was thwarted to Laplace, Louisiana. The conclusions drawn by Schelly and Stretsky's (2009) study were that while the grassroots environmental justice protests blocked or thwarted construction in a particular region initially chosen, all three ended up setting up in a "similarly disadvantaged community" (Schelly and Stretsky 2009: 376). They did find, however that these new facilities sited in the different regions ended up emitting less pollution than the initially proposed facilities and this is one goal that was achieved as one of the environmental justice ideals is that pollution reduction should be reduced in all communities (Taylor 2000). We see in Schelly and Stretsky (2009) examples of where successful community efficacy and mobilization can successfully thwart local facility siting.

2-1 Theoretical Explanations for Environmental Inequities

Much of the environmental justice research is related to issues having to do with the interplay between race/ethnicity, income, employment, and other measures of socio-economic status. As these characteristics are inter-correlated, it is often difficult to show whether the disproportionate burden is one that is related to income, ethnicity, employment, or some combination of these (e.g. Sadd et al. 1999; Fricker and Hengartner 2001; Morello-Frosch et al. 2001). The relationship of socio-economic and demographic statistics with respect to hazardous waste sites (TSDFs), TRI facilities, and other environmental indications has been debated, and these issues have cultivated considerable attention from academics.

The greater weight of recent research suggests that environmental disamenities are often distributed in an unequal manner with respect to social, demographic, and economic characteristics of the population. However, although researchers have conducted many analyses in order to demonstrate that patterns of present-day racial and socioeconomic disparities in fact do exist, less has been done to identify and test explanations behind such disparities. Theoretical explanations in the literature are limited. However, to date, Saha and Mohai (2005) and Mohai and Saha (2007) are the only known studies that clearly and comprehensively offer a range of theoretical explanations for the distributional inequities which persist. Their theoretical framework offers explanations for distributional inequities based on economic, sociopolitical and racial factors (see for example Mohai and Saha 1994; Saha and Mohai 2005; Mohai and Saha 2007; Taylor 2014). These categories of explanations can be used to explain the two general processes that result in a disproportionate number of racial minorities

and low income populations proximate to environmentally hazardous facilities. These processes are 1) disproportionate siting, which refers to the placement of hazardous facilities in communities with significantly higher proportions of racial minorities and low income groups at the time of siting, and 2) post-siting demographic change, which refers to the demographic changes that can occur after the siting of facilities which can factor for the present day racial and socioeconomic disparities around such environmental hazards (Saha and Mohai 2005; Mohai and Saha 2007; Taylor 2014).

2-2: Economic Explanations

In looking at issues of the siting process, economic explanations for disproportionate siting focus on the site selection largely based on cost minimization and profit maximization. It is argued that a location for a facility is often determined based on the estimated profitability of a location involving such things as operating costs after siting, lower property values, access to labor, raw materials and markets (Newman and Sullivan 1987; Blair and Premus 1987; Erickson and Wasylenko 1980). On the part of waste facilities, proximity to waste supplies can be an important consideration in order to reduce transportation costs for supplies. Also, overall transaction costs including costs to build and operate a facility are likely to be heavily weighed in location decisions since costs can be high, especially in areas where there may be public opposition, long delays and other legal hindrances. Saha and Mohai (2005) find two distinct themes in the literature suggesting that transaction costs may be factors in disproportionate siting. The first emphasizes the importance of property value considerations and portrays disproportionate siting by race and socioeconomic status to

be an unintended consequence of cost minimization/profit maximization business decisions. By choosing to locate in areas with low property values to lower transaction costs, minority and low-income neighborhoods may be inadvertently selected due to the fact that they coincidentally live in these areas with lower property values.

Disproportionate siting is said to occur because areas with low industrial property costs are also likely to be nearby areas with low residential property values (UCC 1987; Mohai and Bryant 1992; Been 1994).

Another transaction cost involves dealing with public opposition to new facility siting. A rejected proposal can be very costly for a facility. Even if it is not rejected in the end, the costs of legal battles, delays and damages to the company's image can incur significant transaction costs (Saha and Mohai 2005; Dear 1992). Siting proposal rejections may carry significant opportunity costs and public opposition can cater to this since high opposition can cause significant delays or rejections. Because an industry considers such potential costs of public opposition, they may be likely to select a location where the probability of incurring such costs is minimized (Bullard 1990; Hamilton 1993). Communities are likely to be selected where there is the least likelihood of effective public opposition as companies are more apt to take the "path of least resistance" (Morell and Magorian 1982; Bullard 1990; Mohai and Bryant 1992). Further, low-income and minority communities are less likely to wage effective opposition campaigns and hence are more likely to fall in the "path of least resistance" (Cerrell Associates 1984; Bullard 1990; Grossman 1991; Portney 1991). In sum, the economic explanation accounts for disproportionate siting as an outcome of siting location decisions by industries operating within a market economy. There is an interplay of

transaction cost considerations and other market-based considerations in such site selection decisions. Land value plays a significant role in the economic explanation of disproportionate siting as the underlying cause of the placement of facilities have to do with market reasons in line with cheaper property values. It is cheaper for hazardous waste facilities to locate in these areas as it is cheaper for minority residences to inhabit these areas as well.

Economic explanations of post siting demographic change involves the economic factors behind housing markets and the broader economy which can result in demographic changes that increase the percentage of low income and minority populations to neighborhoods hosting environmental hazards. This suggests that the existence of environmentally hazardous facilities will adversely impact a neighborhood by economically downgrading the area and as a result, the existing non-minority, more affluent populations tend to move out of these environmentally undesirable and economically depressed areas while minority or low-income populations tend to move in and take advantage of the depressed land values and economy. Declines of individual, household and neighborhood economic conditions has affected the lowering of housing values and declines in socioeconomic status in part due to lower housing demand amongst middle and upper income households and a larger influx of lower socioeconomic minorities (Been 1994). These areas tend to become even more impoverished due to such demographic shifts and housing situation (Mohai ad Saha 2007).

2-3: Sociopolitical Explanations

Sociopolitical explanations of disproportionate siting consider the social, political and legal contexts of permitting decisions and rely on power differentials in potential host neighborhoods and shortcomings in siting policy to explain disproportionate siting (Mohai and Saha 1994; Saha and Mohai 2005). In looking at post-siting demographic change, these sociopolitical explanations can be used to look at social processes of neighborhood decline and further show how lack of political power in host neighborhoods contributes to post-siting economic downgrading. Sociopolitical factors can function towards concentrating persons of color and lower income populations in neighborhoods in which environmental hazards have been sited (Mohai and Saha 1994; Saha and Mohai 2005).

As discussed above, the social and political processes involved with private and public siting decisions, namely in the role of organized public opposition, can be related to the “path of least resistance” argument, which holds that minority and low-income communities end up with a disproportionate share of environmental burdens due to having less ability to influence siting decisions than do affluent white communities (Bullard 1990; Bullard 1993; Greenberg, Anderson, and Rosenberger 1984). Public participation in the siting process can be seen as crucial to effective opposition since without such opposition, a proposal that meets technical and regulatory requirements are likely to be approved for siting (Kraft and Kraut 1988; Davy 1997). On the other hand, if neighborhoods are able to effectively mobilize opposition, it becomes much more difficult. It has been suggested that minority and low-income groups are more likely to have unwanted facilities sited in their neighborhoods simply because they tend

to lack the resources and political power to effectively mobilize opposition and resist such siting proposals (Bullard 1983; Bullard 1993; Morrison 1986; Bullard and Wright 1987; Mohai 1990; Mohai and Bryant 1992; Hamilton 1993; Hamilton 1995).

Another sociopolitical explanation has to do with the legal and regulatory context in which siting decisions are made. There are shortcomings to the current siting policy that contribute to disproportionate siting by failing to reduce or equalize the power imbalances and reach more equitable outcomes (Higgins 1993). This increases the likelihood of distributional politics and persistent outcomes of the “path of least resistance.” In addition to this, the legally mandated criteria for state agency approval of certain siting proposals may put minority and low-income communities at a disadvantaged position from the outset (Davis and Lester 1988; Davy 1997). For instance, federal policies and guidelines do not require that the demographics of proposed host neighborhoods be considered in the permitting process and this causes decision-makers to be unaware of the potential for disproportionate impacts from their resulting decisions (GAO 1995). Therefore since siting policies do not include explicit equity provisions to prohibit or limit disproportionate outcomes (Cole 1992), distributive politics are likely to continue. As a result there are no measures to stop the siting of future environmental hazards even in areas that already house a disproportionate number of environmental facilities. The existence of such environmental hazards can pose social impacts that can directly and indirectly contribute to neighborhood decline and post-siting economic downgrading of these areas. The direct effects come upon those persons who remain in host neighborhoods since there can be adverse health impacts such as minor and temporary illness, acute illness, chronic illness, disability,

and even life-shortening not only due to the toxic exposures of the hazards but also due to added psychological and financial strains associated with the presence of such facilities (Greenberg, Anderson and Rosenberger 1984; Melius, Costello and Kominsky 1984). Some of the indirect effects can be related to the out-migration of higher-income households resulting from fears about such health risks of pollution and toxic exposures and the persistence of the more marginalized groups to remain in these polluted areas. This leads to sociocultural disruptions resulting from the inability of social and legal institutions to adequately manage technological risk, which further impacts social support systems, delivery of services and the overall economic vitality of a community (Saha and Mohai 2005). Hence, sociocultural disruptions, heightened community conflict and other risks associated with environmental hazards can serve as a mechanism of post-siting neighborhood economic decline and racial transition.

Sociopolitical explanations are important in considering the disproportionate impacts of environmental hazards. The ability to slow or prevent environmental hazards into a neighborhood can be affected greatly by such sociopolitical factors.

Organizational and institutional resources and other sources of neighborhood-level political clout may be lacking in neighborhoods with disproportionately high number of environmental hazards. Further, because of patterns of siting polluting facilities in urban areas, sociopolitical factors operating at a broader geographic scale that have disproportionately impacted urban areas may also have contributed to post-siting economic declines and racial changes in host neighborhoods (Saha and Mohai 2005).

2-4: Racial Explanations

There may also be a number of racial explanations that can be associated with disproportionate siting and post-siting demographic change. Racial discrimination, both direct and indirect (Feagin and Feagin 1986) can have an impact on facility siting processes. Racial explanations influencing post-siting neighborhood change processes involve discriminatory housing practice, namely that which occurs after siting and prevents minorities from moving elsewhere, regardless of their financial ability to relocate.

Direct racial discrimination explanations can explain the occurrence of disproportionate siting as a result of intentional (direct) discriminatory practices. This includes the intentional targeting of minority areas during the siting process for hazardous facilities. Intentional targeting of minority areas can be motivated by racial factors along the lines of the notion that minority communities may be more vulnerable (i.e. economically or sociopolitically) because they are seen as the paths of least resistance. For example, these minority communities often make up low-income groups that are busy just making a living and further, they are more likely to lack the resources, know-how and drive to socially mobilize opposition. As a result, these groups can be more receptive to hosting noxious industries (Bullard 1983; Bullard 1993; Russell 1989). Such forms of direct racial discrimination are therefore largely motivated by characteristics that can often stereotypically be associated with race, and occurs with the act of discriminating one racial group against another.

In addition to this direct racial discrimination, there can be more indirect forms of discrimination where the negative consequences of the siting process are unplanned

and unintended. Feagin and Feagin (1986) describe this as indirect institutional discrimination. Indirect institutional discrimination has to do with “practices having a negative and differential impact on minorities and women even though the organizationally prescribed or community-prescribed norms or regulations guiding those actions were established, and are carried out, with no prejudice or no intent to harm lying immediately behind them” (Feagin and Feagin 1986; p31). Decisions to site locally unwanted land uses in certain areas may arise as a result of such indirect discrimination. Decisions to choose a certain location over another may be made mostly or entirely with motives to maximize profits and efficiency. However these decisions may coincidentally have disparate impacts on racial and ethnic minorities if they are disproportionately located in the areas chosen. Racial and ethnic minorities may live in areas of low property values, near transportation lines, or in other industrial areas. Also, decisions to site a facility in these minority communities may simply be a result of avoiding the costs of public opposition since these communities may not be well equipped to wage effective opposition campaigns or with the motive to minimize land costs or other direct costs. On the part of the industries it may be more about the bottom line and does not necessarily mean that there was a degree of malicious intent or prejudice against these communities. Indirect discrimination also plays a part beyond simply industry site selection decisions since the siting process also involves state, local and federal regulatory agencies to review siting proposals and can issue or deny permits and can thus be key institutional actors. Various legislative and regulatory entities that create the formal law and policies can substantively and procedurally shape permitting decision-making in indirectly discriminatory ways (Kraft and Kraut 1988;

Gerrard 1999). The bureaucratic decision making policies are prescribed within legislative arenas and are in turn another source of indirect discrimination. Feagin and Feagin (1986) conclude that most societal spheres are intimately linked to one another and that discrimination has an inter-institutional character and refer to these conditions as “side-effect discrimination.” Side-effect discrimination is when indirect institutionalized discrimination can also result from institutional policies or practices in which one institutional area is linked to negative aspects of another institutional domain (Feagin and Feagin 1986). These forms of discrimination are likely to negatively affect the ability of minorities to influence policy making and siting decisions. The role of such indirect institutional discrimination in policy making and the interactions among various agency spheres are examples of side-effect discrimination.

Another form of institutionalized discrimination, albeit direct form, can be seen in issues of housing segregation. Racial prejudice and hostility may have had the initial impacts in the racialization of urban space and the disinvestment of inner cities (Logan and Molotch 1987; Sugrue 1996; Pulido et al. 1996; Pulido 2000). However acts of housing discrimination continued to persist even to present day due to longstanding traditions of institutionalized discrimination. Although there have been attempts to dismantle discriminatory practices through the passage of the fair housing laws, which were designed to replace overtly discriminatory laws and policies concerning the real estate industry and lending and insuring institutions, various more subtle forms of racial housing discrimination are still extant (Feagin and Feagin 1986; Bullard, Grisby and Lee 1994; Yinger 1995). For example, such subtle forms of discrimination include unreasonable mark-ups for minorities, selective advertising and convenient excuses for

making units unavailable, in order to restrict minorities from traditionally white areas (Feagin 1994). The housing discrimination explanation posits that the restrictions on residential mobility due to housing discrimination are a key factor affecting the ability of minorities (whatever the income) to move away from locally undesirable land uses. Higher costs of moving may be imposed on minorities and even in the event that certain minority groups are able to move, the areas in which they can readily move to are often limited. As a matter of fact, these limited areas are likely to have other environmental hazards of their own and may not offer much improvement (Kain and Quigley 1975; Saha and Mohai 2005). Therefore, there may be external restrictions limiting minority mobility, which further cause minorities at all income levels to remain in areas with environmental hazards. Racial differences in ability and motivation to relocate are central to the housing discrimination explanation of post-siting demographic change. The mobility-limiting effects amongst minorities of housing discrimination along with the unimpeded out-migration of affluent, typically white residents, may lead to dramatic changes in the composition of host areas relative to areas without environmental hazards. This persists significant racial disparities and associated economic disparities, contributing to disproportionate post-siting neighborhood change (Mohai and Bryant 1992; Been 1994; Bullard et al. 1994; Pulido et al. 1996).

2-5: Literature on Potential Explanations Involving Immigrant Characteristics

It is evident, therefore that although earlier studies have provided empirical evidence of both race/ethnic and income disparities in the present location of hazardous waste facilities, there are still many such questions that are debated by scholars in the

field about the causes of such disparities. Among the many questions however, looking at environmental justice issues with respect to immigrant populations has not been well studied. Hunter (2000) is the only study specifically looking at immigrant populations and environmental hazards to date. Although her study offers some interesting insights that serve as a good starting point for looking at immigrant populations, her study holds some limitations that warrant further exploration. Firstly she focuses her study on county-level characteristics which hold the potential for aggregation error as the author, herself, admits (Hunter 2000: p. 485). Beyond these methodological limitations, one can question Hunter's contention that many immigrants to the United States are socioeconomically similar to native-born minority group members and sees it logical to believe that if native-born minorities face disproportionately high levels of environmental risk, so would immigrants (Hunter 2000: p. 461). Secondly, she finds that "attention paid to environmental equity as related to the foreign-born population is meaningful considering immigrants often face prejudice and discrimination as confronted by many native-born minorities" (Hunter 2000: p. 461). She seems to be lumping immigrants and native-born minorities together, saying that foreign-born and native-born minorities hold similar characteristics that would likely result in disproportionate environmental risk for foreign-born groups as well. However, there may be, in fact, very different characteristics unique to immigrant populations that native-born minorities do not share. It is further possible that these unique characteristics may be significant variables driving disproportionate burdens within immigrant populations. Because the residential patterns of the foreign-born in the United States are related to minority and lower-income groups, it is possible that factors uniquely related to immigrant populations were

overshadowed by the characteristics of race and income. In other words, factors such as race and income that have commonly been associated with present day environmental disparities may not necessarily be the only factors behind such disparities.

Since Hunter's work, Hipp and Lakon (2010) looked at social disparities in health affecting minority communities surrounding toxic hazards. Although this study does not necessarily focus on specifically on foreign-born or immigrant populations, it focuses on six highly populated, ethnically diverse counties in Southern California and found that 15% more Latinos are exposed to 83.4% more toxic waste than an average tract over this time period and tracts with 15% or more Asian are exposed to 33.7% more toxic waste. They were also able to find that tracts undergoing racial/ethnic transformation or general instability were more likely to experience more proximity to the highly toxic wastes a (Hipp and Lakon 2010). Contrary to this, another key finding to this study was that tracts with many highly educated residents had low and declining proximity to such toxic wastes. Hipp and Lakon were able to bring another layer to the study by being able to do their analysis with weighted toxic waste data. This allowed them to further conclude that the highly educated residents were also more likely to experience lower levels of the most toxic wastes (Hipp and Lakon 2010).

Campbell et al. (2010) also came to some interesting conclusions from their study of Maricopa County, Arizona. They found that no matter the estimation process of their studies or the dependent variable, the coefficients for percent Asian remained statistically significant, thereby indicating a sign of environmental injustice. Moreover, the outcome of their study shows environmental injustice particularly against Asians and

especially strong for Asians who live in relative isolation from other Asians. Their results indicate that in Maricopa County, racial clustering is beneficial in resisting new TRI facilities. They looked at variables that served as proxies for collective action by analyzing the level of homogeneity of the given regions and found that collective action really does matter in the location of Toxic Release Inventory (TRI) facilities. The results of their comprehensive empirical analysis find evidence of environmental discrimination in the placement of facilities with the evidence of discrimination against Asians particularly strong (Campbell et al. 2010). Again it would be interesting to see what the results of this study would look like if the ethnic subgroups were disaggregated even further and also to examine if any foreign-born immigrant characteristics in particular had anything to do with the siting of facilities.

Factors uniquely associated with foreign-born immigrant populations may be important determinants of environmental disparities that exist. Such factors can involve such aspects as language barriers and lack of political clout resulting from the small number of voluntary political participation amongst the immigrant groups. Factors such as language barriers and lack of US citizenship leading to less political participation are largely characteristic of foreign-born minority populations and not of native-born racial minorities such as African Americans. For instance, the majority of African Americans are native-born minorities and as a result, they have fewer tendencies towards linguistic isolation and have developed more of a political presence. The number of immigrants has increased with every passing year in the United States, starting in the 1980s and more so, especially after the passing of the 1990 Immigration Act, which raised the ceiling of immigrant entry and resulted in almost 9 million immigrants coming into the

US (Larsen 2004). According to a census report on the foreign-born population in the United States done in 2004, it was found that at that time the US included 33.5 million foreign-born, representing 11.7 percent of the total population and these numbers are projected to increase dramatically in future years (Larsen 2004). Since 1970, the foreign-born population of the United States has increased rapidly due to large-scale immigration, primarily from Latin America and Asia (Gibson 1999). Immigrant populations characterize certain factors that may cause them to become an even more marginalized group than other native born racial minorities, such as African Americans, that have been marginalized especially in the 1960s and 1970s. In terms of environmental burdens, African Americans made up one minority group that was disproportionately affected by these burdens. However since the 1980's (when many of the environmental justice movements began), African Americans have mobilize and voiced public oppositions against environmental hazards, and as a result may presently be a less targeted minority in relation to foreign immigrant groups that are less likely to do so. In other words, in the present day, discriminatory siting may occur due to factors other than simply race and income, and may affect groups such as the foreign-born more heavily as they are characteristic of being more vulnerable and less likely to generate public opposition.

The next chapter will discuss the literature review on immigration sociology and assimilation, which serves as a background in linking the non-assimilated immigrant characteristics with environmental inequities.

CHAPTER THREE:

IMMIGRATION SOCIOLOGY AND ASSIMILATION: A REVIEW OF THE LITERATURE

Unlike many countries that are largely racially homogeneous, the United States stands out as a country that is home to several racial and ethnic groups. Therefore, with the exception of Native Americans, every American is descended from an immigrant and in this regard, immigration is central and “at the core of American society” (Pedraza 1996, p.1). The existence of many individuals with multi-racial backgrounds has its roots in the diversity of people living in the U.S. and in the waves of immigration that is a consistent theme in American history. It would seem to be an obvious statement that the issues of race and environmental justice cannot be fully understood without examining the role of, and sociological processes associated with, immigration. The theories central to immigration studies could potentially be important in explaining the underlying patterns and formation of racial/ethnic communities and residences, and therefore in helping to explain disproportionate environmental burden.

The continuing high rates of immigration coupled with high birth rates of many minority groups have meant that White Americans (who are themselves descendants of immigrants) are declining in proportion (Pedraza 1996, p. 3). Although White Americans still constitute the majority of the population, there has been a rapidly growing population of minority groups and as a matter of fact, the 2010 Census shows that more than half of the growth in the total population of the United States between 2000 and

2010 was due to the increase in the Hispanic population (Humes, et al 2011). The expansion of these groups has generated various issues, including the persistence of environmental justice issues. The 2010 census data show that Hispanics are now the largest minority group in the United States, now surpassing the African Americans who had been the largest group in older decades. Between 2000 and 2010, the Hispanic population grew by 43 percent and in according to the 2010 census, Hispanics in the United States composes 16 percent of the total population (Humes, et al 2011).

Although Hispanics and African Americans are by far the largest of the minority groups, the Asian population has also exhibited rapid growth. Between 2000 and 2010, the Asian population experienced the fastest rate of growth as it increased by 43 percent.

The Asian population had the second-largest numeric growth from 10.2 million in 2000 to 14.7 million in 2010 and this put made them about 5 percent of the total population of the United States (Humes et al. 2011). A recent population report done by the U.S.

Census showed that as of March 2003, the foreign-born population was 33.5 million, making up 11.7% of the population (Larson 2004). Of this, 53.3% were from Latin

America, 25% from Asia, and 13.7% from Europe. It is evident that the large majority of

the foreign-born population in the United States is Hispanic or Asian. The most recent

report put out by the US Census shows that during the past 10 years from 2000 to

2010, the Hispanic population and the Asian population have grown considerably, partly

due relatively higher levels of immigration (Humes, et al. 2011). There is also a large

number of unauthorized migrant populations in the U.S. that remain uncouncted as they

are largely undocumented. In March 2005, it was determined that roughly 11.1 million

people were of the unauthorized population (Passell 2006). "Unauthorized migrant" was

a term used to describe a person who resides in the United States that is not a U.S. citizen, has not been admitted for permanent residence and is not in a set of specific authorized temporary statuses permitting longer-term residence and work (Passell 2006). Since 2000, growth in the unauthorized population has averaged more than 500,000 per year. Most of these unauthorized migrants came from Mexico and there were an estimated 6.2 million unauthorized Mexican migrants in 2005 (Passell 2006). Projections in the growth of the current minority populations including the unauthorized migrants, suggest that the U.S. will become a majority-minority country in a few decades and will be a plurality nation.

The high numbers of the foreign-born can be seen to underscore the importance of studying immigrant populations, especially with respect to immigration in the context of environmental inequalities. The following sections will discuss some theories relating to assimilation and migration that delineate some distinctive characteristics of immigrant populations, many of which are unique to some groups of the foreign-born populations alone. These theories can help explain why immigrant populations, for characteristics other than just being poor or a racial minority, can be subjected to disproportionate environmental inequities.

3-1: Assimilation Theory

Integration and assimilation of racial and ethnic groups into the dominant culture and society is one of the primary theoretical frameworks for sociological research on racial and ethnic inequality (Hirschman 1983). Robert E. Park, one of the pioneers of these theories has argued that there is a long-term trend toward assimilation of

subordinated racial and ethnic groups in modern societies so that eventually these groups will assimilate into the “common culture” and institutions of the society (Feagin and Feagin 2003 p.26). Milton Gordon, another pioneer scholar of the field, in his famous book, Assimilation in American Life (1964), offers a multidimensional perspective on assimilation by presenting three competing images of assimilation: the melting pot, cultural pluralism and Anglo-conformity. He focuses on Anglo-conformity regarding it as the historical reality for the US immigrant groups who have largely given up much of their cultural heritage and conformed substantially to an Anglo-Protestant core culture (Gordon 1964, p. 72-75). Such cultural assimilation or acculturation serves an important dimension of intergroup adaptation and in so doing, the new immigrant groups by conforming to the pre-existing Anglo-Protestant culture, improve their acceptance into the core culture of society. This adaptation has been distinguished into seven dimensions of assimilation by Gordon—cultural (change of cultural patterns), structural (penetration of the core society at the primary-group level), marital (intermarriage), identity (developing a sense of identity linked to the core society), attitude-receptional (absence of prejudice and stereotyping), behavior-receptional (absence of intentional discrimination), and civic (absence of value and power conflict), which ultimately serve as a guide in determining the extent of a group’s assimilation according to both individual, and group level criteria (Alba and Nee 2003, p. 24). Whereas Park saw structural assimilation to flow from cultural assimilation, Gordon distinguished them as well as the other dimensions as separate stages of assimilation that may take place at different rates (Feagin and Feagin, 2003, p. 27). Acculturation can occur in the absence of other types of assimilation while structural assimilation,

which is the integration into the core society at the primary-group level (small groups characterized by personal closeness such as family groups and groups of close friends), is associated with or stimulates all other types of assimilation. In line with this theory, assimilation means that prejudice and discrimination would decline, if not disappear, that intermarriage would be common, and the minority's separate identity would wane (Gordon 1964 p. 80-81). There were flaws to Gordon's initial theories, mainly in that it largely omitted secondary structural assimilation which has to do with the movement of a new immigrant group into the secondary group (specialized and impersonal groups such as corporations, bureaucracies, and political institutions), of the host society.

Gordon revisits these theories in his 1978 book, Human Nature, Class and Ethnicity, and noted that assimilation theory neglected power issues and mentions the different resources available to competing racial groups. He mentions generational changes within immigrant groups over time as substantial acculturation has often been completed by the second or third generation for European immigrants. However a remaining flaw in the universality of his theories is that his findings mainly apply to White European immigrants and their adjustments. Gordon suggests that substantial assimilation along civic, behavior-receptional dimensions have occurred for many European immigrant groups and substantial structural assimilation at the primary group level is now accomplished. Still, even these relatively acculturated groups tend to concentrate their informal friendships and marriage ties either in their immediate ethnic groups or in their general socio-religious community (Feagin and Feagin 2003, p. 28).

In the present day, this type of outcome is even more the case for non-European immigrants, namely those from Latin America or Asia. There are significant barriers for complete structural assimilation for these groups. For instance, Gordon suggests that for complete cultural assimilation, adoption of the English language is one of the key components, but this is something that is not often achieved by incoming immigrant populations until after the first generations. Along with these theories, Herbert Gans and Neil Sandberg have proposed the “straight-line assimilation” thesis (Sandberg 1973). The straight line theory looks at assimilation as a process unfolding in a sequence of generational steps where each new generation represents on average a new stage of adjustment to the host society, that is, a further step away from the ethnoculture established by the original immigrants. This gives rise to a more complete assimilation as each generation passes. Other findings, showed ambiguous outcomes to this thesis (e.g. Glazer and Moynihan 1963) as in many cases the second-generation may follow this line feeling impelled towards complete assimilation whereas the third or future generations, in no doubt being American, can afford to exhibit signs of ethnicity (Alba and Nee 2003, p. 27). Because these latter generations have already adjusted more fully into the host society, they don’t need to be as concerned about hindering their assimilation by showing signs of ethnicity.

Also, Gordon did recognize that racial prejudice and discrimination have retarded structural assimilation, but he suggested that non-European Americans, including African Americans, particularly those in the middle class, will eventually be fully absorbed into the dominant culture and institutions. He perceived African Americans to make great progress along these lines, with the eventual implementation of the

American creed of equality for African Americans (Gordon 1981). Whether or not this in fact has become a reality is questionable. In the environmental justice platform, it may be possible that African Americans have turned out to become a less marginalized group in recent years in comparison to the more marginalized newer immigrant populations. While one may argue that immigrants migrating with wealth allow them to bypass poor communities and move into middle and upper class suburbs, the same group also has means to bypass language barriers with this same wealth (Taylor 2014).

One of the biggest flaws of these early theories however has been that they lacked a more differentiated concept that recognized that American culture was and is mixed as an amalgam of diverse influences that continues to evolve (Alba and Nee 2003, p.23). In the present day, immigrants have come from a wide array of different countries and cultures and each of these ethnic groups and their subgroups is quite distinct within themselves. Assimilation observed amongst the early European immigrants may be very different from the assimilation (present and future) of other immigrant groups such as Hispanics and Asians due to a number of different factors. These factors may have to do with many things such as the historical background of their origins that may further affect their reasons to migrate. Once they reach the U.S. they can be impacted by their current spatial placement and common lifestyle practices that may retard their ability to assimilate as quickly and effectively into the larger 'American' society. Subsequent sections of this chapter will go into greater detail on this and address the immigration patterns of certain ethnic groups.

3-2: Diversity of Immigrants and Their Generations

According to Portes and Rumbaut (2001) and Danico (2004), immigrant children and US-born children of immigrants are the fastest growing segment of the country's total population of children under age 18. These immigrant families are heavily concentrated in a few areas of settlement, primarily in many metropolitan areas of the country (Portes and Rumbaut 1997, pp.21). Today's immigrant population is relatively young. Some 40% of the post-1960 immigrants arrived in the US as children under 18 and another 40% arrived as young adults between the ages of 18 and 34. Some 16 million second-generation persons were born between 1960 and 1997, which means they are still quite young. Among the different immigrant races, there are often distinct differences that cannot be ignored, between the ethnic subgroups of the larger racial categories. For instance, in looking at Asians, at present, among the Asian second-generation, the median age of native-born offspring of Chinese was 14.7 years, 9 years for Koreans, 6.7 years for Vietnamese, and 5 years for Cambodians and Laotians (Portes and Rumbaut 2001, pp.21). According to this estimate, in 1990, there were fewer than 90,000 second-generation Chinese between the ages of 15 and 24 and fewer than 40,000 second-generation Koreans.

There is a major exception, nevertheless, with the Japanese, whose peak immigration waves took place earlier in the twentieth century. Following this peak of migration Japanese immigration slowed considerably to the present where it now reaches barely 1 % of the total Asian migrants in this country (Daniels 1997, pp.83). Their native-born members are mostly third generation or higher, and in this regard their foreign ancestry cannot be equated with second-generation status among the native

born (Pedraza and Rumbaut 1996). “Except for persons of Japanese descent, the overwhelming majority of Asian Americans today are foreign-born, reflecting the central role of contemporary immigration in the formation of these ethnic groups (Pedraza and Rumbaut 1996, pp.316).”

The Indochinese immigrants constitute the largest percentage of the Asian migrant group, and are the newest Asian Americans in the United States. They consist of the refugees and immigrants from Vietnam, Cambodia, and Laos who arrived after 1975 (Pedraza and Rumbaut 1996, pp.316, Tong 2000). Unlike the other subgroups of the Asian race, the Indochinese do not share a history of several generations in America which means they do not have co-ethnic communities previously established by earlier generations. Unlike the other post-1965 Asian immigrants from such countries as the Philippines, South Korea, China and India, the Indochinese has come as refugees rather than as immigrants as defined by the historical outcomes of this group. Following the Vietnam War, they entered outside of regular immigration channels as part of the largest refugee resettlement program in US history. Although the influx of these people into the United States, from its peak in 1980 has been ongoing, the Vietnamese, Laotians and Cambodians do not share a history of several generations in America as the Chinese or Japanese (Pedraza and Rumbaut 1996, pp. 316-317, Tong 2000). Due to this, it was very difficult for the Indochinese to have substantial immigration by family formation or kinship ties. This can be somewhat paralleled to the situation of Koreans and Asian Indians in the early post-1965 migrations. During 1969-1972, previous immigration was simply too small in volume among Koreans and Indians to have generated family chain-migration patterns which characterized the then recent

immigration from China, Japan, and the Philippines (Boyd 1974, pp.512). Although there were similarities in this way between the early migration of the Indochinese in the early 1980s and Koreans and Indians in the early 1970s, there was a larger difference in that migrants from Vietnam, Cambodia, and Laos have been characterized by far larger proportions of rural-originated and less-educated peoples than any other Asian immigrant group (Pedraza and Rumbaut 1996, pp.317, Tong 2000).

3-3: Driving Forces of Migration and Kin Migration

The actual migrating units (either individuals or families) that arrive into the United States, can come as a result of a number of different factors. Depending on the situation at the country of origin and the circumstances at the destination (in this case the United States), the decision to migrate is quite different amongst differing groups of the foreign-born population. Certain push factors and pull factors are quite important along these lines. Push factors have to do with the situation in the immigrants' home country that create a need or desire to move. For instance, depressed economies, religious conflicts and political upheaval of the originating countries have all been reasons for generating migrations to the United States. At the same time, pull factors are characteristics in the receiving countries that serve to attract the immigrants. For instance immigrants may be attracted by the portrayal of better conditions in the United States, such as an abundance of jobs, better educational resources, or more opportunities for success. Therefore, the socioeconomic and political framework of the origin country within which the migration occurs, can be quite important in the determining the outcomes of the immigrants in their new settlement.

R. A. Schermerhorn in his book Comparative Ethnic Relations, suggested four major types of migration ranging from involuntary to completely voluntary migration. This includes “movements of forced labor” such as when enslaved African Americans were forcibly removed to North America, “contract-labor movement” such as the migration of Chinese laborers to western North America, “political refugees” including streams of refugees produced by war such as Vietnamese refugees in the 1970s, and “voluntary migration” which covers the great migration of southern and eastern European groups to the United States in the early twentieth century and certain Asian groups in the late twentieth century (Feagin and Feagin 2003, 24).

Many scholars have investigated these push and pull factors to a greater degree. Everett Lee’s theory of migration (1966) describes how there are specific factors into the decision to migrate and the process of migration, which include the factors related to the place of origin and destination, as well as other intervening factors and personal obstacles. Such ‘push’ and ‘pull’ factors are quite variable at the individual level in that different persons respond differently to the sets of plus and minus factors at the origin and destination, which are important to the actual movement of individuals from one place to another and where they chose to migrate to.

Pedraza (1996) extending from the discourse related to the ‘push’ and ‘pull’ factors discussed by many scholars, including Lee (1966), she discusses these factors in terms of its importance in understanding the selectivity of migration. For instance in the United States, there is sufficient evidence that suggests that there have been economic or other incentives that have been perceived as ‘pull’ factors for immigrants who have moved from their origins to this destination. Nevertheless, these ‘pull’ factors

had to be in close connection with the co-existing 'push' factors that were strong enough to move individuals away from their original location of inhabitation. Bodnar (1985) writes of how, within the immigrants' homelands, the new capitalism that families confronted through selecting emigration therefore forced their decisions to move. This would be an example of a 'push' factor immigrants often face. Different people have different struggles and reasons to leave their homelands and these differences may, in turn, result in the different trajectories, outcomes and future lives of the various individuals that immigrate to the United States. The 'push' and 'pull' factors, therefore, can be seen as the base of the structure of migration in general that propagates individuals and families from their origins to their destinations, even to specific aspects of their spatial locations.

Bodnar (1985) also offers some theories that can support the existence of migration networks:

"Because families and friends were in close contact even when separated by wide oceans, immigrants seldom left their homelands without knowing exactly where they wanted to go and how to get there. Relatives and friends constantly sent information back regarding locations to live and potential places of employment." (Bodnar 1985, p. 57)

This gave rise to what Pedraza (1996) described as "kin chain migrations" in which after the initial settlement of the first immigrant group, later generations followed through the help of the group that had established themselves prior to their arrival. Social networks are very important here, as kin and friends assisted the newer entering

groups to become established in their new country of residence by providing access to jobs and homes, as well as supplying important information, such as market conditions (Bodnar 1985, pp. 83-84). This can be paralleled with earlier European migrations to the US such as in the case of Italians or Irish immigrants situating in enclaved groups in the east coast. Kinship, therefore, facilitated the entry and successful establishment of immigrant families. This, then, can be attributed to the geographic concentration of certain racial and ethnic groups in common areas.

Once again, though, not all immigrant groups are the same or have the same outcomes. Pedraza and Rumbaut (1996), in his investigation of immigration, race and ethnicity in contemporary America, found that patterns of concentration or dispersal vary among different social classes of immigrants, as well as among immigrants with different types of legal status. He finds that there is a distinction amongst immigrant groups based on their occupational background, i.e., professionals vs. manual laborers. The likelihood of dispersal amongst immigrant professionals is greatest because they have a tendency to rely more on their qualifications and job offers than on pre-existing ethnic communities, as opposed to recent refugees who have a shown tendency to gravitate towards where their previous immigrant groups had clustered (Pedraza and Rumbaut 1996). Working class immigrants are also more likely to rely on the assistance offered by preexisting kinship networks. They may be a higher likelihood for working-class immigrants to live in dense ethnic enclaves, so that they may take advantage of many resources for immigrant entrepreneurs, such as cheap labor, working capital, and credit, as well as dependable markets. The adaptation processes and settlement patterns in areas may be quite indicative of the heavy existence of social networks and

ethnic enclaves. Therefore, the decision to migrate to a particular destination can be highly contingent on these aspects (Portes and Rumbaut 1997).

In line with these theories, it is often the case that many minority groups are clustered in certain geographic areas of the United States. Further, Lee's theory (1966) on streams of migration, describe how migration tends to take place largely within well-defined streams. This can help explain why immigrant groups to the United States are likely to coalesce in very specific places. His theory explains how it is common for migrants to proceed along well-defined routes towards very highly specific destinations and that this is true in part because certain opportunities are highly localized. Large movements can take the form of such streams of migration that are highly specific both in origin and destination (Lee 1966, pp.54-55). He refers to the example of Italians who migrated from Sicily to the United States, wherein they placed themselves predominantly in a few northern cities of the US. It is plausible to think that with respect to other minority groups in the United States, too, had a tendency to immigrate in 'streams' to the United States and situate themselves in highly localized areas.

Sanders et al. 2002 in their study of Asian immigrants and their reliance of social ties in the labor market, specifically looks at social capital properties of ethnic networks in the incorporation of immigrants into host societies. They examine how immigrant employment is affected by the presence of social interpersonal ties in the job search. It is often that their network of friends, family and acquaintances often provide an immediate source of information about job opportunities and such information is usually involves advice and help from friends or relatives. The process of kin, friend or acquaintance based information is usually informal and is an integral interpersonal tie

between immigrant workers who do not have other resources for employment. Through this, immigrants then have a constant and reliable channel of information so that they can retrieve information about new job openings and conditions of employment. These resources are key in the dissemination of information that helps immigrants obtain employment and can strongly affect their well being as well. Dissemination of information goes beyond the initial employment ventures of new immigrants.

Immigrants who become employed in the mainstream economy serve as conduits of information about opportunities outside the ethnic enclaves and thus offers an informal exchange of information for immigrant groups. This then, allows the employment process of immigrant populations, to go beyond the economy of their ethnic domain in their job searches. This is what Sanders et al 2002 describe as “ethnic ties operate as bridging ties.” Social capital amongst the immigrant kin helps the incorporation of immigrants into the social mainstream and is facilitated by increasing the immigrants’ economic opportunities while engaging them in a wider slice of society (Sanders et al. 2002; Boyd 1989). The importance of these networks not only applies to economic migrants, but is also important to refugees and asylum seekers who often choose a route and destination strongly influenced by existing networks (Koser 1997; Castles 2008).

3-4 Brief Overview of the History of Migration by Race

As stated in the beginning of this section, it is a fact that most all groups that live in the United States were all immigrants at one point in time. Amongst the larger racial minorities that exist today--African-Americans, Hispanics, and Asians, it is a fact that the

majority of black immigration began earlier—mainly from Africa-- and has longer history in the U.S. while Hispanic and Asian are marked by more recent immigration. Most African immigration came during the early 1600s-1860s during the peak of commercial capitalism and the slave society in America. Africans came to the country enslaved as property and became the major source of labor for plantation capitalism at a time when the U.S. Constitution legitimated slave trade. Interestingly, this era was the same time English and Irish Catholics immigrated as well, although the English became mercantilists. The next group of immigrants that came in the historical chain was in the 1860s-1910s. They were the Chinese, who came as contract labor and low-wage miners, construction workers and menial laborers for whites, the Italians, who moved as European peasants into US industrial capitalism as low wage industrial and construction laborers, and Eastern European Jews that came as skilled and unskilled laborers and small entrepreneurs. The Japanese immigrants followed in the 1880s-1900s, largely coming as agricultural laborers, domestic workers and later created small farms and businesses. After this, until the mid-1960s, US immigration legislation was so restrictive that most Asians wanting to emigrate could not enter. During this time, a large number of Mexicans entered and with Asian/European labor reduced, Mexicans were recruited for farms and industries as well as low-wage jobs in urban industries. Concurrently, African-Americans were undergoing extensive internal migration. Coined the Great Migration, this phenomenon-- which occurred from approximately 1910 until about 1970—created similar situations to immigration. The Puerto Ricans came in the 1940s -2000s as early farm laborers and then as blue-collar workers in the service economy. The most recent immigration was between the 1960s-2000s, consisting of Asian,

Caribbean, Latin American and Middle Eastern Groups. Government action in South Korea, Vietnam, Taiwan, and Philippines stimulated out-migration as Cubans, Haitians and Middle Easterners fled political repression and societal turmoil in their home countries. Most of these newer immigrants created economic niches and small businesses (Feagin and Feagin 2003 p. 50-51; Ng 1998; Tong 2000; Hurh 1998).

3-5 Current Immigration and Assimilation Outcomes

Today the Latino population is the fastest growing racial minority in the United States and make up almost one-third of the residents in California (Feagin and Feagin 2003 p. 202). Most of the Latino populations in Los Angeles are Mexicans. Cultural assimilation for the first generation immigrants primarily involves learning the English language and certain norms of everyday work and public settings. They are often marked by large, extended, patriarchal unit families and a substantial degree of cultural identity. The Spanish language is usually the predominant primary language and a significant minority, especially those in Los Angeles has much fluency in English. Neither structural assimilation at the primary group level nor marital assimilation are high for Mexican Americans as a group and structural assimilation at the economic level has come slowly even for Mexican Americans in the second and third generations. Mexicans have close ties to the culture of their home country and hence are slow to the assimilation process by providing an external and supportive foundation for the home culture and social networks (Feagin and Feagin 2003 p 230-231).

Among immigrants of other racial categories, Asians are one of the most diverse in terms of the differences that exist amongst the migration of, assimilation trajectories

and overall outcomes based on the various Asian subgroups. According to the 2000 US Census, the Chinese make up the largest number of Asians in the US at 2,432,585, followed by the Filipino, Vietnamese, Korean and Japanese. According to the 2010 Census, the Asian population grew faster than any other race group in the United States between 2000 and 2010, making this growth four times faster than the growth of the rest of the population (Hoeffel 2012). The Asian population increased from 10.2 million to 14.7 million and 46 percent of these Asians lived in the West, making the Western states the most heavily concentrated among all the other states in the Asian population. The 2010 Census also showed that Los Angeles had the second highest Asian population in the United States, following New York (Hoeffel 2012).

The Chinese and Japanese are one of the first immigrants to the United States, but in terms of present day immigration, there are relatively few Japanese immigrants that have come to the United States in recent decades. Since the 1980s, Filipinos, Chinese, Koreans, Vietnamese, and Asian-Indians have been among the fastest growing immigrant groups in the United States (Hurh 1998, Ng 1998, Tong 2000). On the other hand, among the Asian American groups, Japanese Americans have the highest percentage of those born in the US and have been held as the most assimilated of all Asian American groups if not of all other immigrant minority groups. The younger generations of Japanese Americans have intermarried at rather high rates and often have little retention of the Japanese language. Japanese Americans' ties to their home country are not generally strong and cultural assimilation, especially in regard to language, religion and orientation to white-collar employment has been rapid for later generations (Hoeffel 2012). One of the easier ways to understand the assimilation of

the different Asian subgroups is to divide them by category. Kitano and Daniels (2000) suggest a typology of three major categories to describe the overall assimilation of Asian Americans based on degrees of overall assimilation to the dominant culture and institutions and the strength of “ethnic identity.” The categories are as follows:

1. High assimilation/Low ethnic identity- Well adapted to the dominant culture in terms of language and lifestyle and retain only weak ties to the old language and culture
2. High assimilation/High ethnic identity- Moves freely between both Asian language, culture and community and the dominant culture
3. Low assimilation/High ethnic identity- Attachment to Asian culture and community strong and adaptation to the dominant culture very weak.

A large number of Japanese Americans fall under the first category. Their language, lifestyle and expectations are more similar to those of whites, with high rates of marriage to non-Asians and loss of traditional culture. The second category is composed of a significant proportion of Filipino and Asian-Indian Americans. Under the second category, there is a strong retention of group identity and cultural and friendship patterns and interests reflect a bicultural perspective. Groups that make up the second category thus remain substantially bicultural and are usually comfortable with their identity. The third category is composed of many Korean and Vietnamese immigrants. These groups are usually recent immigrants that have spent most of their lives in traditional urban enclaves and although they have made some adaptations to the dominant culture, they prefer their own communities. Friendships, networks and marriages are typically within their own groups (Kitano and Daniels 2000 p 190-192). In

general, as a whole, Asian Americans have had socioeconomic success and have often been stereotyped as a model minority. In the political spectrum, however, no Asian American group has achieved comfortable equality in terms of fully participating in the mainstream politics and society without paying higher social, material and psychological costs than the dominant white group (Feagin and Feagin 2003, p.322).

In the American context, overall assimilation is greatly affected by and begins with English language fluency. For immigrants originating from non-English speaking home countries, learning to speak English is the most fundamental step towards being able to participate in the life of the larger economy. Everything from finding a job to applying for citizenship hinges on the first steps of learning the dominant language. Language, therefore, has been the principal initial barrier confronting recent immigrants, and in the language-unassimilated state, there is very little if not any distinction between the backgrounds the new immigrants originate from (Rumbaut 2008). Language is also important not just for strictly functional purposes of life in the United States, but also serves as the core of national identities and ethnic solidarities (Portes and Rumbaut 1996; Rumbaut 2008).

CHAPTER FOUR: THEORETICAL ARGUMENTS AND FRAMEWORK

The theoretical framework draws from two main areas of study: environmental justice (Chapter 2) and immigration sociology (Chapter 3). In looking at issues relating to disproportionate environmental burdens, there is a synergistic relationship between these two bodies of literature. The study of environmental justice, as seen in the literature review has a lot to do with the recognition and identification of discriminated populations, and the group characteristics that are associated with different outcomes related to exposure to environmental burdens. By looking deeper into the theoretical backdrop of immigration sociology, we are able to learn more about foreign-born populations and can identify them as a specific type or group that is marked by certain characteristics that are very specific to this group and not shared by non-foreign-born minorities. These characteristics specific to foreign-born group are lack of English language proficiency, non-citizenship, and ethnic enclave dwelling, all three of which can also give rise to stunted upward mobility. These characteristics are not shared with all racial and income groups, a fact thus far not considered in environmental justice research.⁵ This chapter discusses immigration sociology and its relevance to

⁵ For ease of reference, the three foreign-born specific characteristics mentioned above (such as lack of English language proficiency, non-citizenship, and ethnic enclave dwelling) may be collectively referred to as “foreign-born characteristics” throughout this dissertation.

environmental justice literature and develops the theoretical arguments behind the research questions of this dissertation.

4-1 Inequality, Immigration and Assimilation

Racial and ethnic inequality in the United States has endured and persisted throughout the years, although it has seen numerous changes over the past 6 decades since the close of World War II. Research in this field of racial and ethnic inequality has shown that there are recent changes in ethnic and racial stratification in the United States apart from the traditional findings, which have emphasized that economic stagnation and economic restructuring are impediments towards achieving equality (Waters and Eschbach 1995). It seemed as though the economic growth of the postwar decades could decrease racial and ethnic disparities, as it became the backdrop for a period of both legal and substantive changes in racial and ethnic inequality by dismantling Jim Crow separatism by court decisions and legislative action. The rising general levels of prosperity in the country created an opening for a black middle class, while at the same time the open opportunity structure created by this expanding economy helped ease the incorporation of latter generations of immigrants that entered the US from Europe before and during the early decade of the century (Waters and Eschbach 1995). However, at the close of the twentieth century the group disparities did not disappear. The rapid pace of economic growth in the immediate post war period could not be sustained after the 1960s and stalled further progress towards racial equality. A number of these recent changes also involved the incorporation of the new waves of immigrants that have arrived to this country since the immigration law

reform in 1965 (Waters and Eschbach 1995). Immigration has been consistently growing since the immigration law reform of 1965 to the point where current demographic projections predict that Americans of European descent will become a minority in the United States sometime during the next century. As a matter of fact, this projected shift has already started to happen in some urban areas such as Los Angeles and Miami (Edonston and Passel 1991). Massey (1995) argues in his study of the incorporation of today's immigrants, that because of fundamental differences, their assimilation is unlikely to be as rapid or complete as that achieved by European immigrants in the past. He goes on to conclude upon the nature of ethnicity and how it is likely to change as a result of a new immigration that is "linguistically concentrated, geographically clustered, and temporally continuous into an American society that is increasingly stratified and unequal" (Massey 1995 p. 632-633).

Recent immigration and assimilation can be compared to the European assimilation in the US for many reasons. However, there is a limitation in viewing the process of European assimilation as a model for the incorporation of the more recent immigrants, i.e. Asians and Latin Americans, into the US society. Firstly, the absorption of European immigrants was greatly facilitated by historical conditions that no longer exist in present day. This historical condition had to do with the landscape of the United States in the three decades between 1901 and 1930 in which a deluge of European immigrants came in, but virtually stopped for the next 60 years after the 1930s. During this time, European immigration was severely limited due to the passage of restrictive immigration legislation. The influx of European immigrants suddenly stopping for 60 years had a large impact on the immigrants that had come during the three decades

between 1901 and 1930 in that they lived in an environment where they were not subjected by co-existing “new” immigrants that could influence them culturally. In other words, this eliminated the persistence of ethnic identities that would be brought with the newer migrants from their home countries. As each successive generation came about, they had a higher chance of being more distant to their home ethnic cultures and become more assimilated with the dominant mainstream American culture. Therefore, during the 60 year migration stagnation, the already migrated immigrant’s newer generations held ethnic identities that existed predominantly as a result of processes and events operating domestically within the dominant culture of the United States with less and less influence of ethnic identities of new immigrants, as there were close to none (Massey 1995). Secondly, in addition to this generational change, the sustained economic expansion of post-war America fueled an unusually high amount of opportunities and socioeconomic advancement (Massey 1995).

In present day, neither the long hiatus in immigration nor the economic boom that accompanied it, are structural conditions for the new immigrants from Asia and Latin America. As a result, the outcomes of assimilation are quite different. The current landscape of the country is not reflective of any long-term immigration hiatus, and conversely, the United States is more likely to continuously perpetuate immigration. This supports the likelihood of continuing to augment fresh, ethnically intact immigrants from foreign countries (Levy 1995; Massey 1995; Phillips 1990). New immigrants and their children are likely to encounter a different economy than the one experienced by the earlier European immigrants. Instead of economic growth, and occupational mobility, the current economic trends point downward, entering a highly stratified society

characterized by high-income inequality and growing labor market segmentation (Massey 1995). Because of these inequalities and the lack of a robust economy, upward mobility is decreased, and especially for people with limited education. Income inequality has grown, mobility in the occupational structure has decreased and continuous immigration will strengthen the influence of first-generation arrivals in creating ethnic culture, including retaining the language of the host country (Hout 1988; Levy 1995; Massey 1995; Phillips 1990). Socioeconomic advancement amongst the second and third generations will be slower and hence make them look more like the first. In addition to this, networks of social ties have started to develop to link migrants in destination areas to friends and relatives in sending regions, while pockets of concentrated communities giving rise to enclave economies form and further facilitate immigration (Massey et al. 1994; Massey 1995; Portes and Bach 1985; Portes and Manning 1986; Logan, Alba, and McNulty 1994). These regions have often been labeled as “ethnic enclave” communities in most of the scholarship on this subject and this term is also used to label such in this dissertation.

To recapitulate, the emergence of these ethnic enclaves reduces the incentive and opportunities to learn the dominant cultural habits, language and behavioral attributes of the dominant American society (Massey 1995). Instead, the highly concentrated geographic destinations of the new immigrants lend to creating large foreign-language and cultural communities within the US. In addition to being more geographically clustered, the present structural conditions, among other ethnic characteristics will likely increase the weight of the sending country’s language in defining ethnic identity (Massey 1995). Unlike European immigrants that were scattered

across more national-origin groups and languages, thus limiting linguistic segmentation in the US, the new immigrants are more clumped together and concentrated linguistically. Some 40 percent of these new immigrants speak the same Spanish language and can further decrease the incentive to adopt the dominant English language (Massey 1995). As a result, the new immigrants are less likely to learn English than their European counterparts at the turn of the century (Jasso and Rosenzweig 1990).

4-2 Foreign-Born and Environmental Inequities

When characteristics unique to the foreign-born are considered, they may be associated with environmental disparities. From a theoretical perspective there has been different studies looking at the patterns of environmental inequities. Most of them have considered race and other socioeconomic variables as determinants of disproportionate environmental burdens, but the role that characteristics uniquely associated with foreign-born status play has rarely been considered. This dissertation adds to the existing body of research on environmental justice. It analyzes the distribution of hazardous waste facility location outcomes in Los Angeles County by incorporating foreign-born variables that have not been investigated fully in other studies. This study also conducts a longitudinal analysis of hazardous waste facility placement and distribution, with respect to foreign-born variables. Although prior studies have attempted to test whether the current situation of environmental disparities are due to minority move-in or discriminatory siting, no study to date has considered the role of immigrant vulnerability in such analyses. In one prior longitudinal study of

hazardous waste facilities in Los Angeles County, Pastor et al. (2001) examined whether the pattern of disproportionate proximity to TSDFs is reflective of disproportionate siting at the time of siting or if it is a result of a subsequent move-in of minority residents to an area already housing a facility for economic reasons (e.g. affordable housing, availability of jobs, etc.). They found that in Los Angeles County, the current situation of environmental disparities is due to disproportionate siting rather than minority move-in (Pastor et al. 2001). This dissertation adds to the existing studies and looks to analyze in greater detail the current situation of these disparities and see if there are other links that characterize the groups that are disproportionately burdened.

Many prior environmental justice studies have offered different theoretical explanations for disproportionate siting. In Chapter 2 of this dissertation, many of these studies are described and detailed including Mohai and Saha (2007), Saha and Mohai (2005) and Taylor (2014), which offer three very clear theoretical categories that are underlying theories amongst other relevant studies in the field. A quick recapitulation of the three they propose, are the following:

1. Economic explanations. These include income and financially driven reasons whereby facilities are sited in areas where land values and operational costs are low. These areas are concurrently where minorities tend to live as they often take advantage of depreciated land values, which often translates to cheaper residential property values. Furthermore, the existing white or more affluent populations tend to move out of these cheaper properties. The areas tend to become more impoverished due to the changing demographics and housing situation as well as the deteriorating environment.

2. Sociopolitical explanations. These include the lack of social capital and political empowerment in the communities that end up preventing them from successfully mobilizing as a group to ward off or lobby environmental hazards from situating near their dwellings. These communities are more likely to become targeted groups in the “path of least resistance” argument, which holds that disproportionate siting practices occur in minority and low-income communities because these minority or low-income populations have less ability to influence siting decisions and effectively organize public opposition than affluent White populations. Also, the existing permitting process, siting laws, and policies in place generally do not include provisions to mitigate the power imbalances nor promote more equitable siting outcomes and hence may put minority and low-income communities in a more disadvantaged position from the onset.

3. Racial explanations. These explanations have to do with the role race plays in discriminatory practices in both environmental siting and housing practices that may cause and persist environmental disamenities. The emergence of social stigmas and prejudiced attitudes towards certain racial minorities inevitably cause discrimination of certain racial groups. The racial discrimination explanation involves both direct and indirect forms of discrimination in the siting process, which is explained in greater detail in the Chapter 2 literature review.

These three important factors that have served as underlying reasons for environmental disparities among an array of different studies in the field. This

dissertation proposes to add another theoretical category termed “immigrant vulnerability.” Foreign- born characteristics are coupled with sociological theories describing assimilation of new immigrants into the mainstream society. Apart from foreign-born racial minorities or low income populations, new foreign-born populations have other disadvantages that do not characterize non foreign born races not such as lack of fluency of the English language, not being naturalized citizens, (which can severely limit civic involvement such as voting), or dwelling in ethnic enclaves that can strengthen attachments to ethnic identities and limit assimilation into the mainstream society. It transcends issues based on pure economics and the color of ones skin. Non-assimilated foreign-born populations have an added disadvantage in that they are from foreign cultural backgrounds that can isolate them, and may significantly limit their growth of social capital. This may further limit their opportunities in life from their occupations to education.

Furthermore, for many new foreign-born minorities there is the added hurdle of having to learn the dominant language of the mainstream society. As seen in certain immigrant sociology theories and discussed in Chapter 3 of this dissertation, certain foreign-born races, such as the Hispanics and some Asian subcultures, have a tendency to live in highly functioning ethnic enclaves that in many cases can provide a disincentive to learn the language, culture or to assimilate into the larger society. Thus their disadvantaged status persists and hence continues to stunt their assimilation. In terms of environmental disparities, consistent with the “path of least resistance” argument, non-assimilated foreign-born groups may be highly susceptible to becoming a targeted groups. Not only does the lack of English proficiency prevent them from

being informed about possible upcoming siting decisions in their neighborhoods, but this can also limit their ability to mobilize as a group to ward off new facility siting. Although some such characteristics of foreign-born groups overlap with certain sociopolitical explanations offered by prior studies, characteristics that are distinct to foreign-born populations (such as language, non-citizenship and ethnic enclave dwelling) can serve as a larger impediment to their assimilation in relation to non-foreign-born minorities that are not affected by these “foreign-born characteristics” that are the source of immigrant vulnerability.

Thus, it is important to look more deeply into issues and characteristics of foreign-born groups in relation to environmental hazards. In addition to race, income and sociopolitical factors that have an affect on environmental disparities, foreign-born factors such as language, citizenship and ethnic enclave dwelling can have an effect on environmental disparities as well. These foreign-born factors do not perfectly fall under any one of the three categories of race, income and sociopolitical factors and are worthy of analyzing in their relationship to environmental disparities.

Bullard (1990) discusses the problem of black communities as targets for environmental hazards. He discusses how historically toxic dumping and location of locally unwanted land uses (LULUs) have followed the “path of least resistance,” which pertains to the disproportionate burden of black and poor communities from these facilities. He goes on to say that the sociological implications of the not-in-my-backyard (NIMBY) phenomenon, which refer to the decision-making process of where to locate hazardous wastes, garbage dumps and polluting industries, have most negatively affected blacks. He says that, “more often than not, these LULUs ended up in poor,

powerless, black communities rather than in affluent suburbs” (Bullard 1990, p. 5). This is often the case even though the benefits derived from industrial waste production are directly related to affluence (Bullard 1990).

Although it had once been hypothesized that low-income minorities were not concerned about the environment to pose a threat to facility sitings, this has been found to be untrue (Mohai 1990; Mohai and Bryant 1998). Taylor (2000) states that low-income minority groups also care about the environment. Nevertheless, African American groups were considered easier targets for toxic waste facilities in their neighborhoods, rather than middle-class white neighborhoods. After such targeting however, African American groups began to protest. They amassed themselves to focus on the notion that environmental hazards should be fairly, equitably, and justly distributed, regardless of race or class (Taylor 2000; Bullard and Johnson 2000; Taylor 2014). The acts of the protestors of Warren County, North Carolina (the majority of whom were African American), which is said to be the birthplace of the Environmental Justice movement, was an example of such voicing as they engaged in a 3-year NIMBY protest (Bullard 1990). These examples of the African American experience and especially the success of their mobilization to fight against these environmental hazards are important in building the theory for why in more recent years African Americans as a group could be a less attractive target for hazardous waste sitings.

It seems that while the environmental justice movement continues to persist amongst low income and minority groups, the issue has not been intricately examined by distinguishing the traits of the different minority groups affected, such as foreign-born versus non-foreign-born. If we look at the specific characteristics of foreign-born

immigrants, we find that they are not necessarily traits that all minorities share equally. For instance, as a minority group, African Americans are the least subject to assimilation limiting immigrant vulnerability, the predominant one of which is language. On the other hand, large percentages of Hispanic and Asian minority groups are laden with foreign-born characteristic limitations. Could it be that impediments of immigrant vulnerability that limit mainstream incorporation have become a stronger predictor of environmental disparities? If this is true, then are racial minorities with little to no immigrant vulnerability such as the African Americans not as strongly impacted as racial minorities characterized by foreign-born traits when the two groups are compared with each other?

In order to more accurately decipher this, one must individually examine each racial/ethnic group and classify them based on the degree they possess immigrant vulnerability—looking at how the percentage the minority groups are correlated with immigrant vulnerability. Please note that the Native American population was not included in this study due to the fact that there is a very small number of them. Less than 1.5% of the total population in Los Angeles County is Native American where the national average is 1.7%. Based on a review of the existing historical and sociological review of literature on race and immigrant characteristics, the following typology can be hypothesized.

Table 4-1 Race, Income and Foreign-born

RACE	Racial Minority?	High % of Low Income?	High % of Foreign-Born?
White	NO	NO	NO
African American	YES	YES	NO
Hispanic	YES	YES	YES
Asian	YES	NO	YES

When analyzing racial minorities by simply race and socioeconomic status (SES), we can divide racial minorities to fall within two distinct categories: 1) racial minorities with high SES and 2) racial minorities with low SES. Under this distinction, amongst the three racial minority groups: African American, Hispanic and Asian, both African American and Hispanic are racial minorities marked with lower SES levels and are categorically similar, while Asians are racial minorities that generally exhibit higher SES levels. When immigrant vulnerability is brought into the picture, the typologies become more complex. As seen in table 4-1 above, when foreign-born is included we find that the three racial minority groups: African American, Hispanic and Asian are quite distinct amongst themselves. Along these lines, African Americans are distinct in that they are racial minorities that may be marked by lower levels of SES status but are generally not foreign-born, therefore, they are not affected by many adverse characteristics of the foreign-born such as lack of English language proficiency or non-citizenship. Asians, on the other hand, are racial minorities that have a high percentage of foreign-born, so they may be affected by such foreign-born laden characteristics, however, amongst all the racial minority groups, Asians have been found to show the

highest levels of SES status. Hispanics are racial minorities that exhibit both low SES levels and a high level of foreign-born status. In this regard, it is likely that Hispanics are in the least favorable position in terms of the general characteristics minority groups can hold. A new typology or index of race can be assessed based on the distinctions of socioeconomic status and immigrant vulnerability.

Table 4-2 Vulnerability Index of Race by SES and Foreign-Born Classifications

VULNERABILITY INDEX	DESCRIPTION	RACE
Vulnerability Index* 1	High Socioeconomic Status and Low Foreign-born Status	White
Vulnerability Index 2	High Socioeconomic Status and High Foreign-born Status	Asian
Vulnerability Index 3	Low Socioeconomic Status and Low Foreign-born Status	African American
Vulnerability Index 4	Low Socioeconomic Status and High Foreign-born Status	Hispanic

*Vulnerability Index 1 is lowest and 4 is highest degree of vulnerability

We can see that Vulnerability Index 1, which is the most characteristically positive type, is representative of Whites who are not racial minorities. The racial minority classifications range from Vulnerability Index 1 to Vulnerability Index 4 with Vulnerability Index 4 being the highest level of vulnerability and 1 being the lowest. In this case as seen in Table 4-2, Vulnerability Index 4, which is marked by the Hispanic race, marked by low socioeconomic status and high foreign-born status, is likely to be the most negatively impacted based on their background characteristics.

In this dissertation the overall hypothesis states that amongst the racial minority groups that are now and have been historically marginalized in the past, those groups

that are affected by foreign-born variables are likely to be more marginalized or targeted. Unlike the results of many past studies where African American groups were found to be one of the most disparately impacted groups in earlier years (1970s and prior to the 1990s), in latter years, industries may be prone to target less vociferous foreign-born minorities as they are may be perceived as less of a threat to public opposition. They may have less community efficacy towards mobilization to fight facility siting due to their low English proficiency or not even be informed or aware of impending waste facility siting as many of the correspondence sent to homes are only in English (Pulido 2000).

As stated throughout the previous sections in the dissertation, many scholars, (i.e. Bullard 1983, 1990; Cerrell Associates, Inc. 1984; Mohai and Bryant 1992; Hamilton 1995; Saha and Mohai 2005; Bruelle 2000) have argued that there is a high tendency for companies building a hazardous waste facility to choose a community with weak social, economic and political capital, and hence target populations that characterizes the “path of least resistance.” The question in present day, then, is what groups of people are weakest socially, economically and politically. If certain minority groups are now mobilizing grassroots movements to fight against the siting of facilities in their neighborhoods, then what populations would currently fall into the category of the “path of least resistance?” Is there an added effect of foreign-based characteristics in terms of environmental disparities? If so, then can one racial minority group be singled out as being the most disadvantaged?

With these general questions as the underlying premise of this study, seven theoretical arguments and hypotheses that relate foreign-born populations and their characteristics to the distribution of environmental hazards are proposed.

4-3 Theoretical Arguments and Research Hypotheses

Research question 1 and 2 examine race/ethnicity and look at the degree of immigrant vulnerability by race. They ask whether environmental disparities exist for foreign-born populations as well as characteristics that are associated with these foreign-born populations, such as non-citizenship and lack of English language fluency. The theoretical arguments and hypotheses below address this research question.

Theoretical Argument 1:

Historical and sociological scholarship maintains that each minority group is characteristically marked by certain features and attributes based on its ethnic and cultural composition, when it began and ceased migration to the United States and what push or pull factors led it to migrate to the US. In present day, several minority groups do exist. However, we cannot assert that they equally share the same representative characteristics especially in terms of foreign-born variables. Because different racial minorities in the United States originated from different histories and immigrated during different waves of migration, some minority groups are more likely to have more foreign-born characteristics than others. Depending on the country of origin and when migrations took place, some racial minorities presently in the United States are more likely to possess foreign-born characteristics, such as lack of English language

speaking capability or lack of citizenship, which can stunt their assimilation into the mainstream society. However not all racial minorities are impacted the same. For instance, African Americans due to their history and background are much less likely to be marked as a foreign-born population nor impacted by lack of English speaking ability nor lack of citizenship in relation to the Hispanic or Asian groups.

Hypothesis 1: The higher the percentage of Hispanics in a tract, the greater the degree of low socio-economic status and foreign-born status.⁶

Hypothesis 2: The higher the percentage of African Americans in a tract, the greater the degree of low socio-economic status and low foreign-born status.

Hypothesis 3: The higher the percentage of Asians in a tract, the greater the degree of high socio-economic status and high foreign-born status.

Hypothesis 4: The higher the percentage of non-Hispanic Whites in a tract, the greater the degree of high socioeconomic status and low foreign-born status.

These hypotheses will be tested by separating the 2000 census tract data for Los Angeles County by race. The first dataset will be tracts that are composed of at least 50% African-Americans in the population, the second dataset will be tracts that are composed of at least 50% Hispanic in the population, and the third dataset will be tracts composed of at least 50% Asian in the population.⁷ Once the dataset is separated by race, SES and foreign-born variables will be examined for these tracts and compared to

⁶ The cutoff points for “low” and “high” are determined by comparing the results to the LA County average. If the area surrounding the TSDFs are higher in percentage for each of the variables being tested than the county average, then it will be labeled as “high” and likewise vice versa for “low.”

⁷ The deciding factor for delineating a region as predominantly one particular race (African American, Hispanic, and Asian) at 50% or over, was influenced by ethnic enclave literature (i.e. Alba et al. (1997) and Logan et al. (2002)) and also by the premise that since no one tract is exactly 50% percent one race and 50% another race, there are no tracts that are counted twice by using this 50% rule.

the national average, state average and county average for each race dataset.

However, the cut-off points to determine “high” and “low” SES and foreign-born variable values will be by comparing the county average with the areas being examined. If the results are found to follow the “high” and “low” predictions as stated in Hypothesis one through four and indicated in Table 4-1, then these hypotheses are supported.

Theoretical Argument 2:

According to the disproportionate siting and discrimination thesis, many scholars have claimed that race and class discrimination were important factors in explaining why hazardous facilities were located in minority and low-income neighborhoods. While both factors are important in explaining proximity to environmental hazards, race was the more significant factor. Foreign-born populations are not only racial minorities, but have socially limiting characteristics unique to themselves that set them apart to general debilitating characteristics of being merely poor or a racial minority. Foreign-born groups have to undergo cultural assimilation that serves as an important dimension of intergroup adaptation. This type of adaptation results in new foreign-born groups conforming to the pre-existing Anglo-Protestant culture and thereby improves their acceptance into the core culture of society. These are traits that are not inherent to other non-foreign-born minority or low-income groups. Adoption of the English language is another key component for complete cultural assimilation. Those who do not speak the English language may be less politically and socially active, thereby stunting their assimilation into the culturally dominant society. These non-English speaking, non-assimilated groups are more likely to be seen as the path of least resistance in facility

siting decisions. Thus foreign-born communities, where substantial portions of people do not speak English, are more likely to be disproportionately impacted by TSDFs. Not all minorities are of the foreign-born community. For instance, African Americans due to their history and background are much less likely to be marked as a foreign-born population in relation to the Hispanic or Asian groups. Stemming from this, Hispanic and Asian groups are expected to have a higher tendency to possess immigrant vulnerability and bear more disproportionate environmental burdens than other racial minorities, such as African Americans, that do not possess assimilation limiting characteristics.

Hypothesis 5: Tracts proximate to the hazardous waste facilities will have greater foreign-born residents than further away from the facilities

Hypothesis 6: There are higher percentages of non-English speaking populations proximate to environmental hazards than further away from these environmental hazards.

Hypothesis 7: There are higher percentages of racial minorities that bear assimilation-limiting characteristics such as Hispanic or Asian minorities proximate to TSDFs than farther away from these facilities.

These hypotheses will be tested by examining the association between the locations of TSDFs and the percentage of the foreign-born population, the non-English speaking populations and racial minorities residing in the adjacent neighborhoods by using the 2000 US Census. Associations between the locations of TSDFs and the racial composition of the adjacent neighborhoods in the 2000 US Census will be assessed. If hazardous waste facilities are more likely to be near areas with a high percentage of the

foreign-born population, then hypothesis 5 is supported. If the TSDFs are more likely to be located near neighborhoods with a high percentage of non-English speaking populations, then hypothesis 6 is supported. If there are more hazardous waste facilities around Hispanic or Asian neighborhoods as opposed to African American neighborhoods, then hypothesis 7 is supported.

Research question 3 asks if characteristics of foreign-born groups produce an increased degree of marginalization where these foreign-born populations become the “path of least resistance” more so than non-foreign-born racial minorities or low-income populations. It asks if foreign-born minorities have displaced the non-foreign-born minorities in their share of disproportionate burdens of environmental hazards and also what the effects of immigrant vulnerability are when race and income are controlled for. Research question 4 asks if discriminatory siting on part of the hazardous waste facilities, or if post-siting demographic change where certain racial groups shift their area of dwelling from one place to another is the predominate force dictating the racial makeup of these communities. In order to answer these questions, the following theoretical argument and hypotheses are posed. Hypotheses 8 through 10 will be answered through a series of multivariate analyses and a longitudinal analysis of census data from 1970-2000.⁸

⁸ The longitudinal analysis could only go as far back as 1970 because there is no foreign-born census data available in decades prior to 1970 and some variables are not available in 1970 and thus could not be compared to subsequent decades.

Theoretical Argument 3:

Foreign-born populations can possess a number of characteristics that limit their assimilation. Foreign-born populations that do not assimilate into the core culture may have a tendency for less political power and low socioeconomic status, thus, are more likely to be seen as the “path of least resistance” in facility siting decisions. Not being able to speak the English language and being non-citizens are some predominant factors that can be seen to limit assimilation. As a result, such foreign-born populations can be more vulnerable and disproportionately burdened by environmental hazards. With the influx of the foreign-born and the growth of the foreign-born population as a whole in present day, non-assimilated foreign-born populations may be seen as the path of least resistance more than non-foreign-born racial minorities or low income groups that were historically the most marginalized groups. Being a foreign-born minority can almost be seen as having double the negative impact—not only are they minorities by race, but also minorities in terms of language and sociopolitical mobility.

Hypothesis 8: In earlier decades, (ie. 1970-1990), tracts proximate to the hazardous waste facilities will have greater African-Americans than any other minority races.

Hypothesis 9: In later decades (ie. 1990-2000), tracts proximate to the hazardous waste facilities will have greater Hispanics and Asians than African Americans, which are not foreign-born minorities in Los Angeles County.

This hypothesis will be tested by using the areal apportionment method⁹ to test the regions surrounding one, three and five kilometers of a hazardous waste facility for the four decades, 1970, 1980, 1990, and 2000 in Los Angeles County. The race

⁹ Areal apportionment method is explained in detail in the methods chapter, Chapter 5.

variable will be examined for these regions. If in 1970 and 1980, the highest percentage among races surrounding hazardous waste facilities is African Americans and in 1990 and 2000, there is a higher percentage of Hispanics and Asians instead of African Americans, then these hypotheses are supported.¹⁰

Theoretical Argument 4:

Studies investigating the processes by which disparate conditions have arisen have examined the temporal sequence of events leading to disparities (which came first, the people or the pollution) and have found larger proportions of minority and low-income populations in close proximity to environmental pollutants, relative to the majority white and affluent populations. (Been 1994; Been and Gupta 1997; Hamilton 1993, 1995; Kreig 1995; Oakes, Anderton and Anderson 1996; Stretesky and Hogan 1998; Pastor, Sadd and Hipp 2001). A range of theoretical explanations for such distributional inequities has been offered, involving economic, sociopolitical and racial factors. These factors have been used in efforts to explain two general processes that can result in a disproportionate number of racial minorities and low-income populations in close proximity to environmentally hazardous facilities. These processes are: 1) disproportionate siting, which refers to the placement of hazardous facilities in communities with significantly higher proportions of racial minorities and low income groups at the time of siting, and 2) post-siting demographic change, which refers to the demographic changes that can occur after the siting of facilities which can account for

¹⁰ The results will be analyzed based on the assumptions as depicted in Table 4-1 where African Americans are least associated as a foreign-born minority and Hispanics and Asians the most associated as a foreign-born minority category.

present day racial and socioeconomic disparities in the distribution of environmental hazards (Saha and Mohai 2005; Mohai and Saha 2006, 2007; Taylor 2014). Facilities sited in Los Angeles County are likely to be a result of discriminatory siting practices where facilities are located into areas that are high in a certain concentration of minority races.

Hypothesis 8: TSDFs in Los Angeles County were sited in tracts that have high concentrations of minorities rather than low concentrations of minorities.

Hypothesis 9: The demographic composition of neighborhoods proximate to the location of TSDFs has shifted from being predominantly non-foreign-born minorities towards more foreign-born minorities. This can be an indicator the foreign-born minorities over time becoming the “path of least resistance.”

This hypothesis will be tested by longitudinally examining the adjacent neighborhoods around the location of hazardous waste facilities by decade from 1970-2000, to see if there is any type of shift in demographic and foreign-born composition. The tracts surrounding facilities sited between 1966-1975 will be examined using the 1970 census data, the tracts surrounding facilities sited between 1976-1985 will be examined using the 1980 census data, and the 1986-1995 facilities will use the 1990 census data to assess present-day demographic and foreign-born variable conditions at the time of siting. Subsequent decades following the decade of siting will be used to assess demographic changes as a result of post-siting demographic change. These hypotheses will be tested by examining the associations between the host and non-host neighborhoods¹¹ of a facility sited in a given year and the census data for the

¹¹ Non-host neighborhoods are comprised of the remaining tracts that are outside of the tracts within the 1, 3, and 5 kilometer radii of the facility.

decades directly prior to siting and after siting. If the demographics at the time of siting of that TSDFs sited in a particular decade show a disproportionately high concentration of specific minorities, then hypothesis 8 is supported.

If the trends show that the hazardous waste facility adjacent neighborhoods go from being less foreign-born to more foreign-born minorities from 1970 to 2000, where the present day demographics at the time of siting are higher for non-foreign born minorities in the earlier decades (1970-1980) and higher for foreign-born minorities for latter decades (1990-2000), then hypothesis 9 is supported.

The next chapter will discuss the research methods and go into greater detail as to what methods were used to test these hypotheses and all the research questions of the dissertation.

CHAPTER FIVE: METHODOLOGY

The three research questions, 1) Do environmental inequalities exist for foreign-born populations? 2) Which characteristics of the foreign-born populations are related to the likelihood of living near environmental hazards? 3) Do characteristics of foreign-born residents produce an added effect of marginalization that makes those populations vulnerable to disproportionate exposure to environmental hazards; and 4) Are environmental disparities in Los Angeles County a result of disproportionate siting or post-siting demographic change. They lead to the nine hypotheses that have been generated and explained in Chapter 4. This chapter examines the spatial and analytical research methods and describes the data employed to address the research questions of this dissertation.

This study looks at the demographic data of Los Angeles County defined by the US Census of Housing and Population for the years 1970-2000 at the census tract level. The decennial 2010 census only has population and housing variables. When analyzing the variables of interest for this study, the decennial 2010 census included Race and Ethnicity variables only. All other socioeconomic and immigration variables are not included in the decennial 2010 census and are rather in the American Community Survey. This data includes all socioeconomic data as well as language and citizenship status, which serve as immigration variables. The American Community

Survey is collected every year from a much smaller sample size than the decennial census. Due to such inconsistency in the 2010 US Census, the same variables examined in 1970-2000 could not be extracted and compared. Therefore, demographic data of the 2010 census was not included in this analysis.

This study analyses decennial census variables to obtain the demographic characteristics of census tracts and more specifically looks at the relationship between racial, socioeconomic and foreign-born variations of these tracts as it relates to the location of commercial TSDFs in Los Angeles County. Under the Resource Conservation and Recovery Act (RCRA), a US law that protects the environment by regulating hazardous and non-hazardous solid wastes, facilities that treat, store or dispose of hazardous wastes must be governmentally permitted. These facilities under permit and in compliance with RCRA are known as treatment, storage and disposal facilities (TSDFs), otherwise known as hazardous waste management facilities (EPA 2005). In this dissertation, the demographic census data is examined in relation to the location of TSDFs in Los Angeles County. The first two research questions use a cross-sectional analysis of data from the 2000 US Census of Housing and Population data at the census tract level. The third research question implements a multivariate statistical and longitudinal analysis of data from the 1970-2000 US Census of Housing and Population also at the census tract level. Census data prior to 1970 was not included in the study because the variables of interest, namely the foreign-born variables were not measured in the US Census before 1970.

5-1 Data

5-1-1 Spatial Data

Data for the commercial TSDF locations were manually identified. Because there is no comprehensive and complete list of TSDFs for Los Angeles County, data used in prior studies were referenced and compiled. TSDFs were identified by compiling data from four main publicly available databases: 1) the US Environmental Protection Agency's Biennial Reporting System (BRS), 2) the US EPA's Resource Conservation and Recovery Information System (RCRIS), 3) the EPA's Envirofacts Data Warehouse (a higher level of access was obtained through the EPA so that the raw data could be extracted rather than using their general web-based system), and 4) the Environmental Information Ltd.'s Environmental Services Directory (EDS). Each of the facilities extracted from the databases were cross-checked and verified for both location and activity. The status of the facilities (when they opened and whether they were still open or closed) and their precise geographic locations were verified by calling each of the waste facilities. Accuracy of the facility dataset was significantly improved by comparing these different lists and making phone calls to validate whether the facilities were: 1) truly in operation, 2) to what extent they were operating, as well as 3) verifying the actual physical location of the waste facility itself (and not just a corporate office). Many of the facilities listed on prior lists were found to be either defunct, not hazardous, or the corporate offices. In such instances where the locations of the corporate offices were reported, it was often the case that the actual facility was oftentimes located in a remote area. In some cases, there were duplicate facility names with different addresses: one for the facility itself and one for the corporate office. The duplicate cases were removed

from the list and the mis-identified facility location was re-mapped to the proper location of where the facility truly existed. From these efforts, a new, more accurate list of hazardous waste facilities was developed.¹² A facility was included as a TSDf in the study if it met the following criteria: 1) was a private, non-governmental business, 2) designated in 1999 as a hazardous TSDf under the Resource Conservation and Recovery Act, and 3) operated as a commercial facility in 1999. This methodology was employed in previous studies (Bullard et al 2007 p. 50). According to the information gathered, the selected facilities were then geocoded by addresses and digitally mapped by using Topographically Integrated Graphic Encoding and Referencing System (TIGER) files and Geographic Information Systems software (ArcView GIS v. 3.3 and ArcGIS10.2.2). Using these procedures, it was found that there were a total of 413 facilities in the entire United States, and 17 of them were in Los Angeles County. The start dates of these facilities were determined by two methods. The first method was by using the RCRA database, which contained start dates for some of the facilities, but because this database contains self-reported data by the facilities, not all facilities had this information available. Therefore, as a second step, each of the facilities were individually contacted by phone and questioned as to when the facilities were constructed and began operations in their respective locations. Based on the answers that were received, the start date information for each facility was attained. This facility data collected according to the methods described above, correspond to the 2000 census data. This list of facilities as well as the 2000 census data served as a base for

¹² The data obtained from Professor Paul Mohai at the School of Natural Resources and Environment at the University of Michigan, where I worked as a research assistant. During my work for Professor Mohai, I was directly involved in the data collection and construction of the database of TSDf locations for the United States.

this research due to the fact that when the data was initially collected the 2010 data was not yet readily available for analysis. When the 2010 census data became available, the analysis of the TSDFs was repeated with new census tracts and updated demographic data. The TSD facilities were re-examined to confirm they were still in operation. The universe of Los Angeles County TSDFs was geocoded again and overlaid onto the 2000 Los Angeles County census tract shapefiles. The most current GIS software, ArcGIS 10.2.2 was used to analyze the longitudinal data and create new maps of the results.

Comparing decades of the census had become increasingly difficult for the 2010 census given that the tract boundaries were changed, and the 2010 decennial census itself, covered a much shorter list of variables than the previous years. In 2010 the Census Bureau changed how they collected the decennial census and replaced the “long form” with the “short form” and as a result of this, many of the variables that were studied in previous decennial censuses were not available to be analyzed for 2010. Instead, the population and housing data traditionally available through the long form for prior decades is contained in the American Community Service (ACS) data. However the ACS uses a continuous “rolling” sample where a small percent of the population is sampled every month and is updated every year instead of every ten years. These sample sizes and variable collection times introduce a margin of error into the estimates unlike that of the decennial census (<http://www.esri.com/software/american-community-survey>). This can cause a conflict when comparing between ACS data and decennial census data, which is why for matters of this dissertation which is a historical longitudinal study, the 2010 census was not incorporated.

5-1-2 Census Data and Variables

The demographic characteristics for the cross-sectional study (research questions 1 and 2) were determined using the 2000 US Census of Housing and Populations data from Geolytics, Inc. Geolytics, Inc., combines the demographic data from the US Bureau of the Census with digitized maps of census tract units. For the longitudinal study (research question 3), the Geolytics Neighborhood Change Database (NCDB) was used to extract US Census data from 1970, 1980, 1990 and 2000. With the NCDB, data for all three decades were normalized to 2000 census tract boundaries so that data for the various years can be compared easily. Again, in the NCDB, the US Census data is linked with the spatial data of census tracts.

The independent variables used in this study converge upon three main categories: racial, socioeconomic, and foreign-born. Racial variables include the percentages of African American, Hispanic, and Asian and Pacific Islander populations. Socioeconomic variables include the mean household income, percentage of persons below poverty level, and percentage of persons unemployed in labor force. Sociopolitical variables include percentage persons 16 years and over employed in management and professional occupations (white collared occupations), percentage of persons 16 years and over employed in construction, production, transportation, material moving, and other service occupations (blue collared occupations), percentage of persons 25 or over that have a 4-year college degree or better. Foreign-born variables include percentage of foreign-born of total population, percentage of persons that use non-English language at home and speak English not well or not at all, and

percentage of foreign-born non-citizens of total population. These variables were matched with their respective US census tract units in the Geolytics, Inc database.

Different analytical methods were used to answer the three research questions of this study. Depending on what analytical method was used, the dependent variable differed. For the descriptive statistics and longitudinal analysis, the areal apportionment method was used where circular buffers of one, three and five kilometer radii were drawn around each TSDF location to produce consistently sized impact regions for analysis. A detailed description of the areal apportionment method is explained in the next section. For logistic regressions, the dependent variable was a dichotomous variable indicating the presence or absence of a TSDF in the neighborhoods within Los Angeles County (1=TSDF in the neighborhood; 0 = no TSDF). This dichotomous variable was constructed by implementing the 50% areal containment method, which is also explained in detail in the next section. These different distance-based methods used for the different analyses implemented a common method to delineate impact areas surrounding the TSDFs. Consistently-sized circular buffers centered around each facility were constructed to capture the areas of impact and these impact areas were referred to as “host neighborhoods” throughout this dissertation. By creating these host neighborhoods, consistency in the size and shape of the area examined could be achieved so that results could be easily compared across facilities and cross decades for longitudinal studies. In addition to this, standardizing the size and shape of host neighborhoods allowed for the closely proximate areas outside the individual units in which the hazard is actually located, (which is also likely to be affected by the TSDF), and be included in the affected area rather than in the control group (Mohai 1995).

For the 17 commercial hazardous waste facilities found in Los Angeles County, one, three and five kilometer radii buffers were drawn around the facilities to identify the region of impact. No definitive consensus exists in terms of the best-buffered distances, but prior studies in the field have used a range of 0.25 miles to 3 miles (i.e. Pastor et al. 2001, Mohai and Bryant (1992), Boer et al. (1997), Mohai and Saha 2007). The units of one, three and five kilometers chosen for this study best covers the range of distances used in these prior studies as one, three and five kilometers is equivalent to 0.62 miles, 1.86 miles, and 3.1 miles respectively. One, three and five kilometers were also the distances chosen for the Bullard et al. 2007 study which justifies these distances as those that are “well within the distances used in prior studies and within which health, economic and other quality of life impacts have been found to exist” (Bullard et al., 2007 p.42). Therefore, the one, three and five kilometer radii circular buffers were used in this dissertation to control the size of host neighborhoods.

5-2 Spatial Methods

In order to examine the racial, socioeconomic, political and foreign-born disparities in the distribution of the hazardous waste treatment storage and disposal facilities (TSDFs) in Los Angeles County, this dissertation uses variable data from the 2000 US Census combined with the spatial point files of hazardous facility locations by employing distance-based methods (Mohai and Saha 2006). Prior environmental justice studies have used different methodologies in their analyses. Among the differing methodologies, the unit-hazard coincidence approach had been the most commonly used, namely in some of the more well cited studies published to date in this field, such

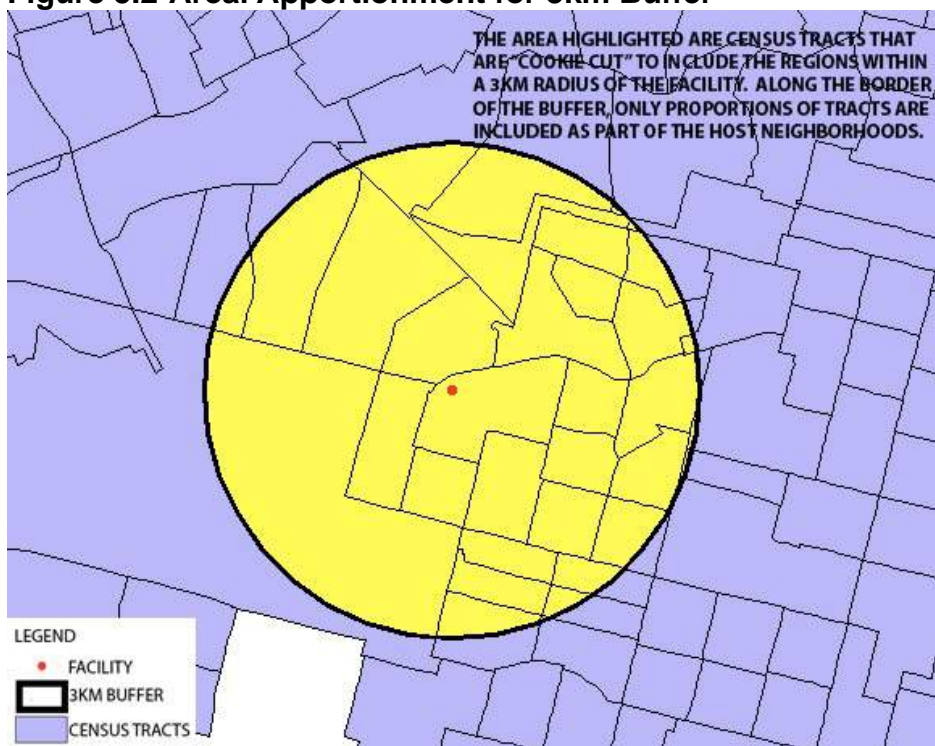
as in the 1987 United Church of Christ Commission for Racial Justice study (UCC 1987), Anderton studies (Anderton et. al 1994) and Been studies (Been 1995). However in more recent studies, such as Mohai and Saha (2006), it has been demonstrated that the unit-hazard coincidence method is inadequate in properly controlling for proximity between hazardous sites and neighboring populations. This method fails to identify the precise location of the hazardous waste site itself and fails to account for the units that are adjacent to the units hosting the sites. This is especially the case when the facilities may be located near tract boundaries where the adjacent tracts can be proximate to the facilities even though they do not host the facility itself. Since the unit-hazard coincidence method only counts the tracts that host the facilities and not the adjacent tracts that could be impacted, the “affected area” surrounding the hazardous waste facilities is not accurately captured. This is an important issue since there are many instances where facilities occur near tract boundaries. As a matter of fact, in the United States, it has been found that roughly half of the hazardous waste facilities are located in close proximity (0.25 miles) to boundaries of the tracts that host them (Mohai and Saha 2006).

This study used the distance-based methods in which the precise locations of the hazardous waste facilities were mapped and the distances to the nearby populations were more accurately controlled. The demographics of all geographic units that were within a specified distance of the facility itself are accounted for and captured. These spatial units were then aggregated or averaged with respect to the distance of the facilities. Among the three main distance-based methods: centroid containment, 50% containment, and areal apportionment, areal apportionment was employed to conduct

all descriptive analyses and longitudinal analyses. The 50% containment method was used for logistic regression analyses. These approaches are explained in more detail below.

The areal apportionment most accurately captures the area surrounding a certain radius of the facility (Mohai and Saha 2007). This method then aggregates the weighted population characteristics of the intersected census tracts captured, where the weights correspond to what percentage of the tract area that falls in the circle of the given radii (Mohai and Saha 2006). As mentioned earlier, in this dissertation, circular buffer radii of one, three and five kilometers were used and centered at the location of each of the 17 TSDFs. The buffers were intersected with the census tracts using the Xtools extension for ArcView GIS Version 3.3. An example of the areal apportionment method for a three-kilometer buffer can be seen in Figure 5.2.

Figure 5.2-Areal Apportionment for 3km Buffer

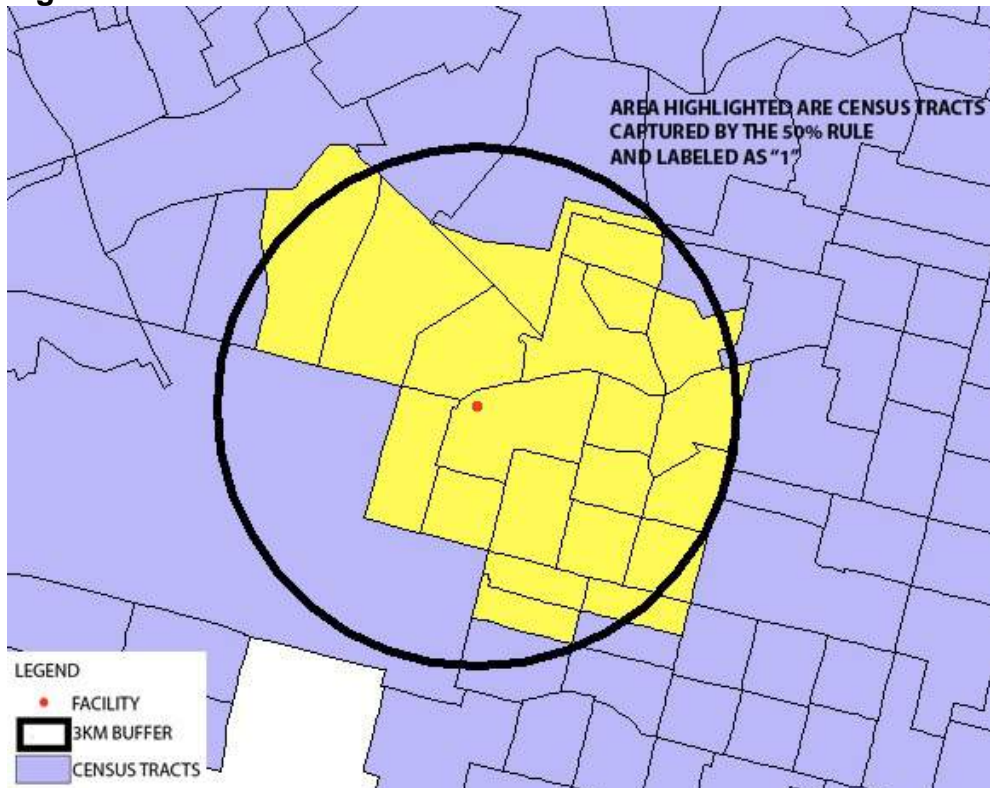


The intersection resulted in circular areas of the one, three and five kilometers radius containing tracts surrounding the TSDF. The demographics of the tracts that were fully contained within the buffered regions were counted in its entirety and the demographics of the tracts that were captured along the border of the buffers were calculated as a proportion of the area that was captured. In order to calculate these proportions, two main steps were required. First, the percentage of the area of each tract within each circular buffer was computed. Then, this percentage (proportion) was multiplied by the total demographic data for the tract. For instance, if the buffered region captured 60% of a certain tract containing a population of 100 people, then this percentage (60%) was multiplied by the total (100). The estimated population contained in the host neighborhood was 60 for that tract. By weighing the populations of the partially intersected units by the proportion of the unit's area that is captured by the circle of given radii, the risk of over or under-estimation of demographic characteristics within the given circled radii of a facility can be minimized. The main drawback of the areal apportionment method lies in that the weights given to the demographic data with respect to a captured tract assumes that the population is evenly distributed in the tract itself. This type of uniformity assumption, however, is no different in any other method of analysis used in prior literature, such as in those that used the once common unit-hazard coincidence methods (Mohai and Saha 2006; Mohai and Saha 2007).

In performing statistical analyses, the 50% areal containment method was used. The 50% areal containment method involved mapping the precise location of the hazardous waste facility and then capturing the tracts within a specified distance of the facility following a specific rule as follows. All units whose areas are at least 50% within

a specified radius circle of a facility is considered as a part of the host neighborhood around the hazardous facility.

Figure 5-3 50% Areal Containment Method For 3km Buffer



For purposes of statistical analyses in this dissertation, a dichotomous variable was constructed where the label "1," was given for tracts captured within the buffer and was therefore a part of the host neighborhood and "0" was given for tracts not captured by the buffer. Therefore, the 50% areal containment method allowed the creation of a dichotomous dependent variable by being able to distinguish units that were either part of the host neighborhood or not.

All these spatial methods for the analysis were conducted using ArcView 3.3 software. Spatial maps were created by importing all shapefiles and attribute data into ArcGIS 10.2.2 for further analysis and all maps were exported into layouts. Importing

into ArcGIS 10.2.2, allows for more analytical capabilities due to the advancement of the program.

5-3 Analytical Methods

5-3-1 Descriptive Statistics

The first and second research questions 1) Do environmental disparities exist for foreign-born populations, and 2) What characteristics of the foreign-born populations are related to the likelihood of living near environmental hazards, involve implementing a cross-sectional analyses of 2000 US Census data.

In order to answer these research questions, this dissertation aimed to first establish a classification of specific races and the degree of immigrant vulnerability they exhibit. This establishes whether or not immigrant vulnerability exists for all racial minority groups and if these characteristics are more pronounced with certain racial minority groups as opposed to others. The main dataset was partitioned by racial concentration into four distinct racial categories: African American, Hispanic, Asian and Non-Hispanic Whites. Tracts that are 50% or greater of each of the listed races was included in each of the datasets by race. For instance, tracts that have 50% or more African Americans were extracted and labeled the “African American Tracts.” The same is true for Hispanic, Asian and Non-Hispanic White datasets. No tracts in Los Angeles County were exactly 50% one race and 50% another race. As a result, no two tracts overlap in the 4 new datasets determined by race. For purposes of labeling, these new datasets have been collectively called the “Race-Specific Tracts.” Using these Race-Specific Tracts, descriptive statistics were used to determine the percentages of each

variable in question for this study. Socioeconomic variables including the mean household income, percentages of: persons below poverty level, and persons unemployed in labor force, persons 16 years and over employed in management and professional occupations (white collared occupations), persons 16 years and over employed in construction, production, transportation, material moving, and other service occupations (blue collared occupations), persons 25 or over that have a 4-year college degree or better will be examined. Foreign-born variables including percentages of: foreign-born of total population, persons that use non-English language at home and speak English not well or not at all, and foreign-born non-citizens of total population were examined to produce a typology of races in relation to both socioeconomic status and immigrant vulnerability. Establishing this is important not only for purposes of running the descriptive statistics of socio-economic and immigrant vulnerability by race, but was also used for statistical analyses later in the study.

To answer research question 2, what characteristics of the foreign-born populations are related to the likelihood of living near environmental hazards, the demographic dataset incorporating all LA County tracts and races was used and compared to the location of hazardous waste facilities. For the 17 hazardous waste facilities, standardized host neighborhoods were created by drawing circular buffers of one, three and five kilometers from these hazardous facility location points using the areal apportionment method. The demographics of the one, three, and five kilometer host areas were compared to all areas beyond the one, three, and five kilometer host areas (non-host areas) in order to assess disparities of race, socioeconomic and foreign-born variables. A more specific discussion of these methods is stated above in

section 5-2. These descriptive statistics were used to test whether or not there are disproportionate environmental burdens specific to foreign-born populations and those with foreign-born characteristics.

To visually represent the spatial relationship between the location of hazardous waste facilities and the demographic characteristics that make up the tracts in the area of study, GIS maps were created. These maps graphically depict the range of the demographic data that make up each of the tracts and the actual location of each of the facilities within the tracts. By using the maps, we can assess the spatial relationship between where the environmental hazards are located and the demographics of the regions that are most proximate to these hazards.

5-3-2 Methods for Statistical Analyses

The statistical analytical methods used in this study involve bivariate correlations and multivariate analyses employing logistic regression. Research question 3 involves the use of statistical methods to determine whether the characteristics uniquely associated with foreign-born status are important in explaining environmental disparities when controlling for the more traditional race, economic and sociopolitical explanations of environmental inequality and in order to assess whether there is an added effect of immigrant vulnerability for environmental disparities. A series of logistic regressions was used to test this.

The first series of logistic regressions were conducted using the entire dataset of all Los Angeles County tracts and the independent variables derived from the 2000 US census (discussed in detail in section 5.2), to see which are statistically significantly

linked to proximity to hazardous waste facilities. Model 1 includes race, socioeconomic and foreign-born variables together to see if the foreign-born variables are statistically significant even when controlling for race and income. However, because this dataset had a high tendency for multicollinearity, a number of different diagnostic tests and analytical methods were performed. Correlations for all variables being considered for the analysis were conducted and depending on the results of the correlation matrix, the logistic regression was conducted in a stepwise method and certain variables were introduced in separately. For instance, in looking at the race, socioeconomic, and foreign-born variables, each category of race variables was introduced into the model individually. For instance, Model one, two and three look at the racial, socioeconomic, and foreign-born variables alone, respectively. Model 4 looks at racial and socioeconomic variables and Model 5 looks at just socioeconomic and foreign-born variables and Model 6 looks at all three, racial, socioeconomic and foreign-born variables together. In comparing the results of Model 1-6, we can determine if foreign-born variables are statistically significant when controlling for income and race and also to examine how the results differ between these models.

5-3-3 Longitudinal Analyses

In order to examine effect of immigrant vulnerability more fully, and answer research question 3, a longitudinal analysis was performed. The foreign-born conditions were compared for census tract areas within and beyond 3 kilometers surrounding a hazardous waste facility at the time of siting for the years 1970, 1980, 1990, and 2000. This will determine if the concentrations of immigrant vulnerability

within a 3-kilometer radius of the hazardous waste facilities are greater than beyond the 3-kilometer radius for each of the three decades in question. Also, by taking into consideration the year in which each facility was sited, the longitudinal study will help analyze if there were any increased or decreased levels of immigrant vulnerability before or after facility siting. To test the presence of post-siting demographic change where foreign-born minorities move into an area in which a facility is already sited and non-foreign-born minorities may move out, host neighborhoods around the location of hazardous waste facilities were examined to see if there were any shifts in demographic and foreign-born composition after the facility was sited. The tracts surrounding facilities sited between 1966-1975 were examined using the 1970 census data for demographics at the time of siting and looked at the 1980-2000 censuses to assess the conditions post-siting. The facilities sited between 1976-1985 were examined using the 1980 census data to assess conditions at the time of siting and used 1990-2000 censuses to analyze demographic change post siting. For the facilities sited between 1986-1995, the 1990 census was used to determine the demographics at the time of siting and only one decade, 2000, was used to observe any post-siting demographic changes. Trends were examined to see how the demographic composition changes over the four decades surrounding hazardous waste facilities from 1970 to 2000. A comparison of the racial and foreign-born variables surrounding the host and non-host neighborhoods for facilities sited across the four decades was analyzed. This analysis examined the patterns of non-assimilated foreign-born minorities in close proximity to hazardous waste facilities between the previous and following decades surrounding facility siting.

The next chapter will present the results of the descriptive statistics surrounding hazardous waste facilities in 2000 as well as an analysis of racial subgroups by socioeconomic and foreign-born characteristics.

CHAPTER SIX:
DESCRIPTIVE STATISTICS SURROUNDING HAZARDOUS WASTE FACILITIES IN
2000 AND ANALYSIS OF RACIAL SUBGROUPS BY SOCIOECONOMIC AND
FOREIGN-BORN CHARACTERISTICS

The environmental justice literature to date has covered many areas of both cross-sectional and longitudinal research looking at the effects of different race and socioeconomic variables and whether the present environmental disparities are a result of discriminatory siting practices or post-siting demographic change. The literature review in earlier sections of this dissertation covers many of these prior studies in detail. Many of these studies look at race and socioeconomic conditions surrounding hazardous waste facilities, but few have focused on the influence of foreign-born variables on environmental disparities. This study expands on the previous studies by looking closely at such variables. This chapter looks at the current locational disparities surrounding hazardous waste facilities in Los Angeles County with a focus on foreign-born variables representing foreign-born status, English language proficiency, and citizenship. These three variables in the US Census are the most relevant data to serve as proxies for foreign-born status and level of assimilation. The aims of this chapter are twofold. The first is to provide some groundwork to establish relationships between race and foreign-born characteristics in order to provide underlying knowledge of what racial/ethnic subgroups generally do or do not exhibit strong foreign-born characteristics. The second aim of this chapter is to provide a general understanding of the demographic conditions that surround hazardous waste facilities in Los Angeles

County. The subsequent chapters will offer further theoretical explanations for why hazardous waste facilities are disproportionately located in minority and impoverished neighborhoods and explicitly if these foreign-born variables offer an introduction of a new theoretical explanations for hazardous waste facility siting location .

This chapter examines the conditions in close proximity to the hazardous waste facilities in Los Angeles County and offers a cross-sectional examination of these areas with census variables for the year 2000 by not only race but by racial subgroups. The first research question, “do environmental disparities exist for foreign-born populations” and the second research question, “what characteristics of the foreign-born populations are related to the likelihood of living near environmental hazards” will be analyzed. Based on the theoretical framework constructed in Chapter 4, these research questions are answered by testing five hypotheses.

The first hypothesis examines what racial/ethnic groups most closely make up the “foreign-born populations” by observing to what degree each racial/ethnic group exhibits foreign-born characteristics. It postulates that when incorporating foreign-born characteristics with the traditional race and socioeconomic characteristics, a distinct typology of races can be formed in which African Americans are of generally low socioeconomic status and low foreign-born status, Hispanics are of low socioeconomic status and high foreign-born status, Asians are of generally high socioeconomic status and high foreign-born status, and Whites are of high socioeconomic and low foreign-born status. Therefore, the first hypothesis establishes an association between race and foreign-born characteristics by pinpointing the racial/ethnic groups that are associated with higher foreign-born characteristics as compared with other groups. The

second hypothesis postulates that it is more likely that racial minorities that bear foreign-born characteristics such as Hispanic or Asian minorities are stronger predictors of environmental hazard proximity than those who are less likely to embody the foreign-born characteristics such as African Americans. The third hypothesis proposes there are higher percentages of foreign-born populations proximate to environmental hazards than in areas farther away. The fourth hypothesis claims there is a higher percentage of non-English speaking populations proximate to TSDFs than farther away. The fifth hypothesis predicts that there is a higher percentage of foreign-born populations that are not US citizens proximate to TSDFs than farther away from these environmental hazards.

The present chapter will be divided up into first a data and research methods section that recaps the methods that were used to derive the data produced. A more detailed version of the data and methods is explained in Chapter 5 of this dissertation. The second section of the present chapter is the results and analysis section that discusses the findings and interpretation of the outcomes of the study.

6-1 Data and Research Methods

In order to test the hypothesis and analyze the descriptive data for neighborhoods of Los Angeles County surrounding the TSDFs, the areal apportionment method was used. This method implemented census tracts and both ArcView 3.3 GIS and ArcGIS 10.2.2 software were used to identify the denoted regions in the 1, 3, and 5 kilometer circular buffers placed around each of the 17 TSDFs in Los Angeles County. In the prior methodology section of this dissertation, a detailed explanation of the areal

apportionment method is provided. The demographics making up the circular buffers of varying radii, 1, 3, and 5 kilometers are considered to be within close proximity of the hazardous waste facilities and make up the host neighborhoods. The circular buffers create evenly shaped areas around each facility and allow for consistent comparison areas. Areas beyond the 3-kilometer radius buffer around the waste facilities are areas that make up the control population. The area beyond the 3 kilometers, the control population, is at a farther distance from the TSDFs and is less likely to be affected by the negative impacts of the environmental hazards than the area of the host neighborhoods. GIS maps were also created to visually assess the location of each of the hazardous waste facilities and its relationship to the demographic data of tracts that surround them. ArcGis 10.2.2 was used to create variable concentration vs. hazardous waste facility spatial layouts for four major variables of interest. These variables are “Percent African American,” “Percent Hispanic,” “Percent Households that Do Not Speak English,” and “Percent of Foreign-born that are Not US Citizens.” These variables were chosen as the baseline for the overall analysis carried out throughout this dissertation.

To answer first research question and test the first hypothesis, the original dataset consisting of census data for all the Los Angeles County tracts were divided into four main groups, by race. The purpose for creating these datasets was to produce four distinct categories separated by race/ethnic group alone, so that the characteristics of each racial/ethnic group could be further investigated. Because the US Census does not offer individual level data, analyzing specific characteristics isolated to one specific racial/ethnic population is a challenge. Separating the collective dataset of all Los

Angeles tracts by single race/ethnic population percentage is one attempt at addressing this challenge. For ease of reference, this method will be termed as the “racially parsed dataset.” To create this racially parsed dataset, census tracts which had racial/ethnic percentages of 50% or more of each of the four main racial/ethnic groups; African American, Asian/Pacific Islander, Hispanic and non-Hispanic Whites, were separated out. This 50% rule was decided upon testing different percentages to determine statistical significance ranging from 40%-50%. It was found that: 1) no tracts within the total Los Angeles County tracts are exactly 50% one race and 50% another, and 2) the 50% mark gave rise to the least amount of overlap between tracts while capturing the most amount of tracts included under each racial/ethnic group category. For example, at the 45% or more level, there were 112 tracts with 45% or more percent African American, 102 tracts with 45% or more percent Asian/Pacific Islander, 937 tracts with 45% or more percent Hispanic, and 690 tracts with 45% or more Non-Hispanic Whites. The total number of tracts accounted for under a specific racial/ethnic category at the 45% rule was 1841 and the rest of the 213 tracts did not have predominance of one specific racial/ethnic population. However, at the 45% mark, several of the same tracts overlapped amongst different races and were counted twice. As an example, at the 45% majority rule, five tracts were counted in both the African American dataset and the Hispanic dataset. The reason for this was because these five tracts exhibited at least 92% of the total population as either African American or Hispanic with a similar African American to Hispanic ratio (i.e. 46% African American:47% Hispanic). According to the 50% rule, 91 tracts were at least 50% African American, 73 tracts were at least 50% Asian/Pacific Islander, and 846 tracts were at least 50% Non-Hispanic White, for a total

of 1638 counted tracts. At the 50% majority rule, no tracts overlapped or were included twice in different datasets. Upon constructing the four race-based datasets as described, the descriptive statistics were run and compared with the Los Angeles County descriptives. “High” and “Low” were determined by using the Los Angeles County percentages as the threshold. If the respective race-based dataset percentages were higher than the whole Los Angeles County percentages, then the outcomes were considered “high” and if the dataset percentages were lower than the county percentages, then the outcomes were considered “low.”

In order to test the hypothesis and analyze the descriptive data for neighborhoods of Los Angeles County surrounding the TSDFs using the areal apportionment method, census tracts captured in the one, three and five kilometer circular buffers placed around each of the 17 TSDFs in Los Angeles County were used. The demographics making up the circular buffers of varying radii, 1, 3 and 5 kilometers are considered to be within close proximity of the hazardous waste facilities and create evenly shaped areas around each facility and allow for consistent comparison areas. Areas beyond the 3-kilometer radius buffer around the waste facilities that make up the control population are farther away from the TSDFs, and it is hypothesized that these areas are less likely to be affected by the negative impacts of the environmental hazards than those of the host neighborhoods. Included in this analysis are data on race, and socioeconomic variables including income, employment, occupation and education data as analyzed in prior studies. In addition, data on foreign-born characteristics, such as percent foreign-born of the population, percent non-citizenship, and percent non-English language speaking are also included to serve as indicators for

the degree of social assimilation. The more extensive range of variables, including these foreign-born variables in this study, offer a more comprehensive and thorough understanding of the conditions of the communities surrounding hazardous waste facilities.

6-2 Results and Analyses

Table 6-1 shows the descriptive statistics for the census tracts in Los Angeles County for the 2000 US Census variables. There are a total of 2054 census tracts in Los Angeles County, seven of which have a population count of zero. 2047 census tracts contain at least one person. In terms of race, the percent Hispanic population has the highest mean of 43.6% and a standard deviation of 29.6%, followed by the percent non-Hispanic White population, which has a mean of 32.1% and a standard deviation of 28.5%. The percent African American population has the lowest mean at 9.5% with a standard deviation of 15.7%. The percent Asian/Pacific Islander population mean is at 12.1% with a standard deviation of 15.1%. Not all the races are represented in the 2047 tracts as all four racial/ethnic groups are found to have minimum racial percentages of 0%. Also, with the exception of the percent non-Hispanic White population, which has a maximum of 100%, no tract is fully represented in its entirety by just one racial/ethnic group. In terms of the socioeconomic variables, the mean percent of persons below poverty level is at 18.0% with a standard deviation of 13.0% and the mean household income is \$60,678 with a standard deviation of \$36,241. There is a higher mean percent of people with white collar occupations at 31.6% with a standard deviation of 17.9%, than percent of people with blue collar occupations which is at a

mean of 25.7% with a standard deviation of 14.8%. The tracts in Los Angeles County in 2000 also show a higher mean of percent without a high school degree at 32.6% with a standard deviation of 22.7%, than percent with a four-year college degree or higher; whose mean is 23.2% with a standard deviation of 18.7%. All socioeconomic variable percentages show a minimum of 0% and a maximum of 100%. The maximums of 100% can be explained by the fact that some tracts have a very small amount of people —10 people or less. The means for foreign variables for the tracts in Los Angeles County are found at 35.7% for the percent of the foreign-born population, 16.0% for the percent of persons who speak little to no English, and 22.0% for the percent of non-citizens. The standard deviations for these three variables are 16.3%, 12.8%, and 14.0%, respectively.

Table 6-1 Descriptive Statistics of Census Tracts in Los Angeles County in 2000

	N	MEAN	SD	MIN	MAX
Racial Variables					
% Black Alone	2047	9.5%	15.7%	0.0%	96.2%
% Asian-Pacific Islander Alone	2047	12.1%	14.1%	0.0%	82.3%
% Hispanic	2047	43.6%	29.6%	0.0%	99.6%
% Non-Hispanic White	2047	32.1%	28.5%	0.0%	100.0%
Socioeconomic Variables					
% Persons below Poverty Level in 1999	2041	18.0%	13.0%	0.0%	100.0%
Mean Household Income in 1999	2041	\$ 60,678	\$ 36,241	\$ 5,157	\$ 395,276
% Persons Unemployed	2041	8.8%	5.9%	0.0%	100.0%
% White Collar Occupations	2040	31.6%	17.9%	0.0%	100.0%
% Blue Collar Occupations	2040	25.7%	14.8%	0.0%	100.0%
% Persons 25 Yrs and over w/o HS Degree	2047	32.6%	22.7%	0.0%	100.0%
% Persons 25 Yrs and over w/ 4 Year College Degree	2047	23.2%	18.7%	0.0%	100.0%
Foreign-Born Variables					
% Foreign-Born of Total Pop	2047	35.7%	16.3%	0.0%	88.9%
% Speak English Not Well or Not at All	2047	16.0%	12.8%	0.0%	65.0%
% Non-Citizens of Total Pop	2047	22.0%	14.0%	0.0%	66.9%

Table 6-2 shows the descriptive statistics for the four main race-based datasets for the tracts of Los Angeles County. These racially parsed datasets were constructed to compile datasets with exaggerated predominance of one race. For instance, for the African American dataset, only the tracts in which the majority of the population is “African American” were included. The method that was selected to determine a “majority” was if each tract contained at least 50% of a specific race. In the African American dataset case, all the tracts that did not contain at least 50% percent African American were removed. The remaining tracts then, were the ones that had the highest percentage of African Americans. The percentages were determined to be “high” or “low” by comparing the percentages of the respective datasets to the percentages for “All Los Angeles Tracts.” As an example, in the case of high percent African American tracts, the mean household income is \$47,440, which is much lower than the percentage for Los Angeles County at \$61,811. The same holds true for the Hispanic tracts at \$42,116. The opposite is true for Asian and Non-Hispanic White tracts (\$64,145 and \$87,357, respectively). Collectively, the socioeconomic variables depicting low socioeconomic status, percent of persons below poverty level, percent of persons unemployed, percent of blue collared occupations, and percent of persons without a high school degree, are higher in African American and Hispanic tracts than the percentage for these respective variables for Los Angeles County as a whole. For the Asian and non-Hispanic White tracts, the opposite is true. The Asian and non-Hispanic White percentages for these respective variables are lower than the Los Angeles County percentages. If we look at the socioeconomic variables depicting high socioeconomic status, such as percent white collared occupations or percent with a

four-year college degree, the outcomes are the exact reverse of the outcomes of the socioeconomic variables depicting low socioeconomic status when compared to the different racial/ethnic population tracts. Therefore, for the socioeconomic variables, the African American and Hispanic tracts follow the same trends exhibiting “low” socioeconomic levels. Asian and Non-Hispanic White tracts follow similar trends exhibiting “high” socioeconomic levels. In terms of foreign-born variables, African American and non-Hispanic Whites exhibit similar trends. Percent foreign-born, percent not a citizen, and percent non-English speaking are much lower, for both African American and non-Hispanic White tracts than percentages of all Los Angeles Tracts. Along these lines, Hispanic and Asian tracts follow similar trends in that their percentages for these respective foreign-born variables are much higher than the percentages for Los Angeles County as a whole. Therefore, for the foreign-born variables, African American and non-Hispanic White tracts exhibit “low” foreign-born levels whereas Hispanic and Asian tracts exhibit “high” foreign-born levels.

In order to examine these findings even further, more exaggerated datasets for African Americans and Asians were constructed. This expanded analysis is necessary, as in the case of the African American dataset, when using the 50% selection rule for high percentage African American tracts, as there exists a considerable proportion of the Hispanic population (25.3%) mixed in with the African American ‘majority’ tracts (See Table 6-2). The same is true for the Asian dataset, in which a large number of the Hispanic population (20.8%) is mixed into the Asian ‘majority’ tracts. In order to delineate this, both African American and Asian datasets were further rendered to become more respectively homogenous by removing tracts that included Hispanic

percentages greater than 20%. To accomplish this, the new datasets were created by implementing two steps. First, 'high' African American and Asian tracts were filtered out via the 50% selection criteria introduced previously in this chapter. Second, from these selected tracts, any tract that also had high Hispanic population percentages (greater than 20%) were removed from the dataset. This resulting dataset created for African Americans and Asians included tracts that had a high percentage of African Americans (or Asians) and a low percentage of Hispanics. Table 6-3 shows the descriptive statistic results of the new datasets that were created for African American and Asian. In Table 6-3, under 'racial variables' the percentage of Hispanics have noticeably dropped below the 10% range ensuring the tracts being examined in Table 6-3 are much more homogeneously African American and Asian. The results in Table 6-3 are much more pronounced than the results in Table 6-2. Firstly, for both the African American and Asian tracts, descriptives of the newer dataset show slightly stronger socioeconomic variable outcomes. The mean household income is much higher for the newer set of African American and Asian tracts. Other socioeconomic variables representing occupation and education levels have higher correlation to that of "higher" socioeconomic levels. Most marked changes are shown in the group of foreign-born variables. For African American majority tracts, it is even more pronounced that African Americans do not exhibit foreign-born characteristics. Percent foreign-born, percent non-citizen, and percent non-English speaking categories all are much lower than the county percentages for the African Americans and even lower when compared to the percentages of Non-Hispanic Whites. The newer Asian 'majority' tracts reflect some interesting results as well. Once the more Hispanic tracts were removed from the

dataset of Asian tracts, the percent foreign-born decreases from 54.9% (Table 6-2) to 50.7% (Table 6-3), the percent of non-citizens decreases from 25.7% to 20.9% and the percent of non-English speakers decreases from 21.5% to 15.6%. These results demonstrate how for the Asian homogenous tracts, although there is a high percentage of the foreign-born population, they seem to be more assimilated than that of the Hispanic population. This observation can be further assessed by comparing the foreign-born variable outcomes between Asians and Hispanics. According to Table 6-3, 45.5% of the Hispanic tracts are foreign-born. However, 71.4% of these foreign-born are non-citizens. For the Asian tracts, although 50.7% of the Asian tracts are foreign born, only 41.2% of these foreign-born are non-citizens, implying more than half of the foreign-born population within the Asian predominant tracts is naturalized. Also in terms of English speaking ability, in the Hispanic tracts, 25.7% of the population speaks English not well or not at all, which is much higher than the 15.9% Los Angeles County percentage. The same non-English speaking proportion for the Asian predominant tracts is at 15.6% which is slightly lower than the overall Los Angeles County percentage for the population (15,9%). This seems to be indicative of a higher portion of the Asian population being able to speak the English language in comparison the Hispanic population in Los Angeles County.

The results of the racially parsed datasets for the 2000 US census tracts show that in Los Angeles County African Americans exhibit “low” socioeconomic levels and “low” foreign-born characteristic levels. Hispanics exhibit “low” socioeconomic levels and “high” foreign-born characteristic levels. Asians exhibit “high” socioeconomic levels and “high” foreign-born characteristic levels and Non-Hispanic Whites exhibit “high”

socioeconomic levels and “low” foreign-born characteristic levels. Table 6-4 provides a visual representation of these outcomes in table form. From these outcomes, it is arguable that in Los Angeles County the Hispanics are probably the most socioeconomically depressed of all racial minority groups while also the least assimilated in terms of its foreign-born traits. Non-Hispanic Whites are the most socioeconomically well-off and exhibit very low signs of foreign-born characteristics. African Americans and Asians fall in the middle of these groups. African Americans in Los Angeles County, however, are more socioeconomically well-off than the Hispanics, but still do show depressed socioeconomic status overall especially in comparison to Asians and non-Hispanic Whites. African Americans, though, have the least foreign-born characteristics. Asians in Los Angeles County are of socioeconomically higher status in relation to other racial minorities. Also, although Asians do exhibit a high percentage of foreign-born status, the results from this analysis reflect that the Asians may consist of much more assimilated foreign-born populations and thus may be less inflicted by the detriments of certain foreign-born characteristics.

Table 6-2 Descriptive Statistics for “Racially Parsed Datasets” for 2000 US Census Tracts Looking at Race, Socioeconomic and Foreign-Born Variables

	All California Tracts	All Los Angeles Tracts	African American	Hispanic	Asian	Non-Hispanic White
Total Population	33,871,648	9,519,338	405,638	4,079,379	332,760	2,686,034
Population Density	217.18	2,344	8,754	9,483	6,088	861
Racial Variables						
% African American	6.6%	9.6%	66.2%	8.3%	2.5%	3.2%
% Asian/Pacific Islander	11.2%	12.2%	2.4%	6.8%	60.2%	9.7%
% Hispanic	32.4%	44.6%	25.3%	73.7%	20.8%	13.8%
Socioeconomic Variables						
Mean Household Income	\$65,628	\$61,811	\$47,770	\$42,116	\$64,145	\$87,357
% Persons below Poverty Level	14.2%	17.9%	22.5%	25.5%	13.6%	7.8%
% Persons Unemployed	7.0%	8.2%	11.7%	10.8%	5.7%	5.3%
% White Collar Occupations	36.0%	34.3%	29.7%	17.4%	40.9%	51.6%
% Blue Collar Occupations	21.2%	23.3%	21.1%	37.5%	16.1%	11.4%
% Persons 25 yrs and over w/o HS Degree	23.2%	30.1%	27.9%	52.2%	22.4%	9.7%
% Persons 25 yrs and over w/ 4 Yr College Degree	26.6%	24.9%	17.3%	9.0%	33.8%	43.3%
Foreign-Born Variables						
% Foreign-born	26.2%	36.2%	18.4%	45.5%	54.9%	22.8%
% Not a Citizen of Total Population	15.9%	22.5%	12.4%	32.5%	25.7%	10.1%
% Not a Citizen of Foreign-born Population	60.8%	62.0%	67.7%	71.4%	46.9%	44.3%
% Speak English Not Well or Not at All	10.7%	15.9%	8.3%	25.7%	21.5%	4.5%

Table 6-3 Descriptive Statistics for “Racially Parsed Datasets” for 2000 US Census Tracts Looking at Race, Socioeconomic and Foreign-Born Variables for Tracts with %Hispanic Greater than 20% is Removed For the African American and Asian Datasets.

	All California Tracts	All Los Angeles Tracts	African American	Hispanic	Asian	Non-Hispanic White
Total Population	33,871,648	9,519,338	149,727	4,079,379	131,891	2,686,034
Population Density	217.18	2,344	6,840	9,483	3,866	861
Racial Variables						
% African American alone	6.6%	9.6%	77.6%	8.3%	3.4%	3.2%
% Asian/Pacific Islander alone	11.2%	12.2%	3.1%	6.8%	62.2%	9.7%
% Hispanic	32.4%	44.6%	9.3%	73.7%	9.8%	13.8%
Socioeconomic Variables						
Mean Household Income	\$65,628	\$61,811	\$60,339	\$42,116	\$84,635	\$87,357
% Persons below Poverty Level	14.2%	17.9%	13.3%	25.5%	7.8%	7.8%
% Persons Unemployed	7.0%	8.2%	8.8%	10.8%	4.7%	5.3%
% White Collar Occupations	36.0%	34.3%	39.7%	17.4%	51.0%	51.6%
% Blue Collar Occupations	21.2%	23.3%	14.9%	37.5%	11.1%	11.4%
% Persons 25 yrs and over w/o HS Degree	23.2%	30.1%	15.2%	52.2%	12.7%	9.7%
% Persons 25 yrs and over w/ 4 Yr College Degree	26.6%	24.9%	27.1%	9.0%	45.3%	43.3%
Foreign-Born Variables						
% Foreign-born	26.2%	36.2%	9.7%	45.5%	50.7%	22.8%
% Not a Citizen of Total Population	15.9%	22.5%	5.0%	32.5%	20.9%	10.1%
% Not a Citizen of Foreign-born Population	60.8%	62.0%	52.1%	71.4%	41.2%	44.3%
% Speak English Not Well or Not at All	10.7%	15.9%	2.7%	25.7%	15.6%	4.5%

Table 6-4 Typology Derived from Race vs. Socioeconomic and Foreign-Born Characteristics Associations

	African American	Hispanic	Asian	Non-Hispanic White
VARIABLE CATEGORIES:				
Socioeconomic Characteristic Level	Low	Low	High	High
Foreign-Born Characteristic Level	Low	High	High	Low
RACIAL BREAKDOWN BY VARIABLE LEVELS:				
Vulnerability Index 1: Low Socioeconomic and High Foreign-born Levels		X		
Vulnerability Index 2: Low Socioeconomic and Low Foreign-born Levels	X			
Vulnerability Index 3: High Socioeconomic and High Foreign-born Levels			X	
Vulnerability Index 4: High Socioeconomic and Low Foreign-born Levels				X

6-2-3 Spatial Layouts of Variable Concentration vs. TSDFs

The descriptive data for all variables of interest was spatially mapped and assessed in relation to the location of hazardous waste facilities present in the year 2000 in Los Angeles County. A total of 2054 census tracts exist in Los Angeles County. Seventeen hazardous waste facilities (TSDFs) are in operation as of the year 2000 in Los Angeles County. All seventeen of these facilities are located in metropolitan Los Angeles and are pointed out by the circled area (see Figure 6-1). These areas of interest and future

spatial maps of Los Angeles County with respect to TSDF location are zoomed in, with a focus on this area delineated by the dotted circle. Even with a cursory look at the placement of TSDFs locations in Los Angeles, one can note that the facilities are clearly not spatially random. There are small clusters that are visible, even amongst the relatively small number of 17 total facilities. In order to further investigate these areas, spatial maps were created for 5 variables of interest. Each of the variables were classified by natural breaks in the data set and divided into 5 categories of degree of concentration (low to high).

The first of these spatial maps looks at the concentration of African Americans in Los Angeles County in relation to the location of hazardous waste facilities (Figure 6-2). The variation in color from light to dark represents the range of African American population concentration from low to high. In other words, the darker the color of a tract the higher percentage of African Americans residing within that tract. African Americans were examined because in prior studies (e.g. Asch and Senaca 1978; US GAO 1983; UCC 1987; Bullard 1990; Mohai and Bryant 1992; Wright 1992; Bullard 1993; Hamilton 1993; Goldman and Fitton 1994; Brown 1995; Been 1995) African Americans were found to be one of the most disproportionately impacted minority races with respect to environmental hazards. This fact is also an important to this study, because African Americans as a racial minority have the least amount of recent immigration and in most cases are not impacted by certain assimilating characteristics such as lack of English language fluency. African Americans are not generally considered to comprise the 'immigrant population.' It was interesting to see what type of environmental impacts this minority race were affected by in Los Angeles County, where large immigrant

populations reside. The initial viewing of the spatial maps show some interesting results. Only 4 of the 17 facilities were located in areas with at least a mid-range (16.8%-35%) concentration of African Americans. Of these 4 facilities, only one of them was located proximate to tracts with a higher range (61.9%-96.2%) of African Americans. The rest of the 13 facilities (76%) were located near areas of low African American percentage (0%-6%) (See Figure 6-2). From the initial special assessment maps, it is apparent that the majority of TSDFs in Los Angeles do not fall proximate to tracts with high African American percentage.

The Hispanic population concentration was looked at next to see what types of spatial patterns are shown with respect to TSDF location (Figure 6-3). Hispanics are also of interest not only because they now make up the highest percentage of minorities in the United States, but because a substantial percentage of Hispanics are immigrants with low levels of assimilation. This is especially true in Los Angeles County where they tend to live in ethnic enclaves and often lack English proficiency. As stated in the literature review, above, as a race, Hispanics, especially in Los Angeles are largely Mexicans or Mexican Americans. The Spanish language is usually the predominant primary language and a significant minority, especially those in Los Angeles has much fluency in English. Neither structural assimilation at the primary group level nor marital assimilation are high for Mexican Americans as a group (Feagin and Feagin 2003). The results of Hispanic concentration versus hazardous waste facility were interestingly almost the exact opposite of the African American concentration map. All 17 facilities were located in or proximate to tracts with at least a mid-range (37.6%-58%). With the exception of one facility, sixteen of the facilities (94%) were either located in or adjacent

to tracts with a high concentration (78.5%-99.6%) of Hispanic populations. Visually, it is quite apparent that Hispanics in Los Angeles are impacted by TSDFs. Whether it is a result of race alone, or a function of many other variables, it is hard to assess through these diagrams, but the initial analysis of the population seems to suggest that the majority of TSDFs in Los Angeles County exist proximate to tracts with high Hispanic percentage.

If race is not the only factor involved, what could some other factors, other than the usual socioeconomic variables, be? There may be a number of different assimilation-dependent immigrant variables that come into play. The next three spatial maps look at some of these immigrant-related variables. The first of this three is the distribution of TSDFs in relation to the concentration of households that do not speak the English language. In this map, also, the darker color corresponds to a higher percentage of households that do not speak English. The map for lack of English language proficiency looks quite similar to that of the Hispanic concentrations map.

Figure 6-1 Map of Los Angeles County Tracts and TSDF Location

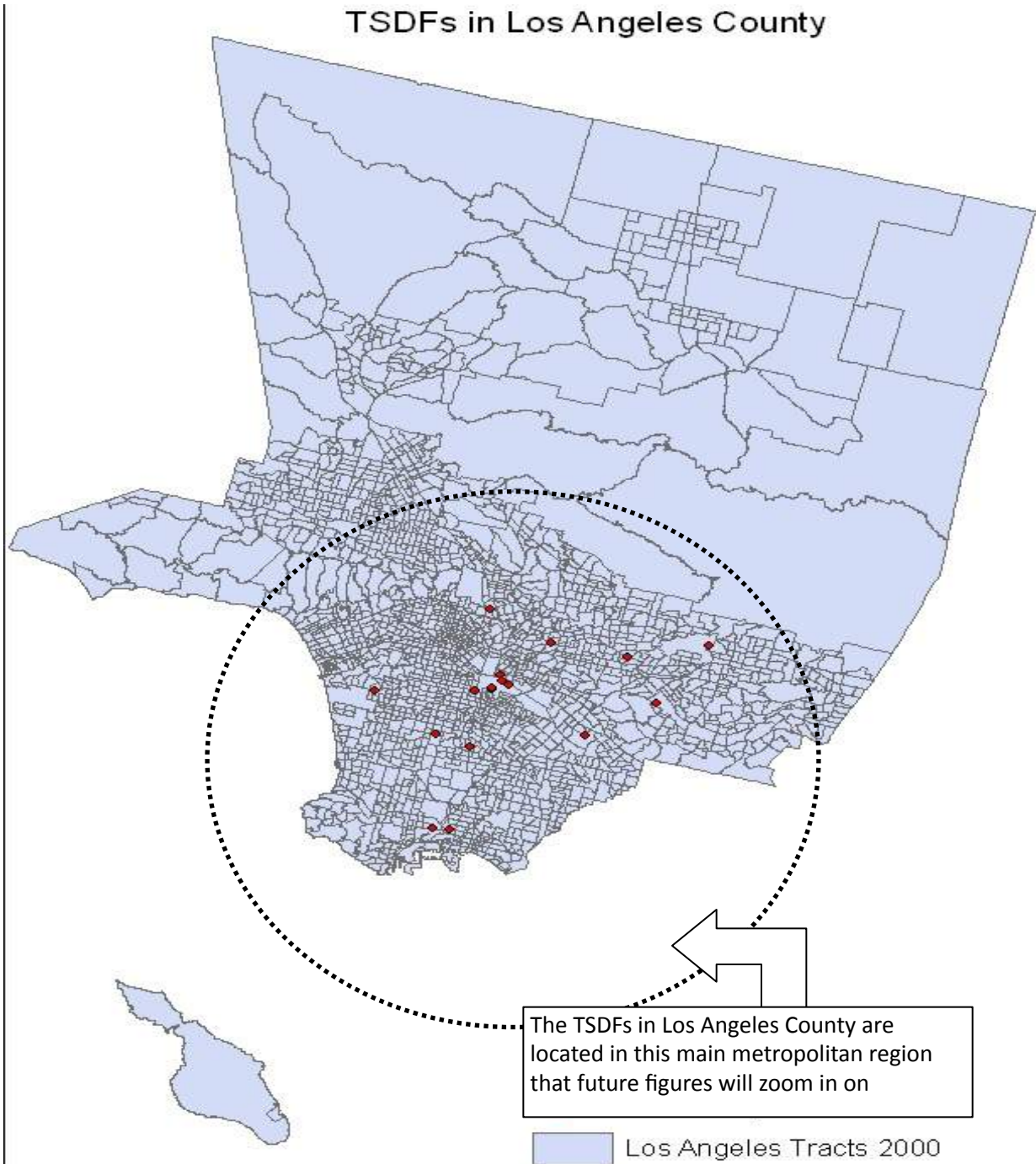


Figure 6-2 Concentration of African Americans in Los Angeles County and Location of TSDFs

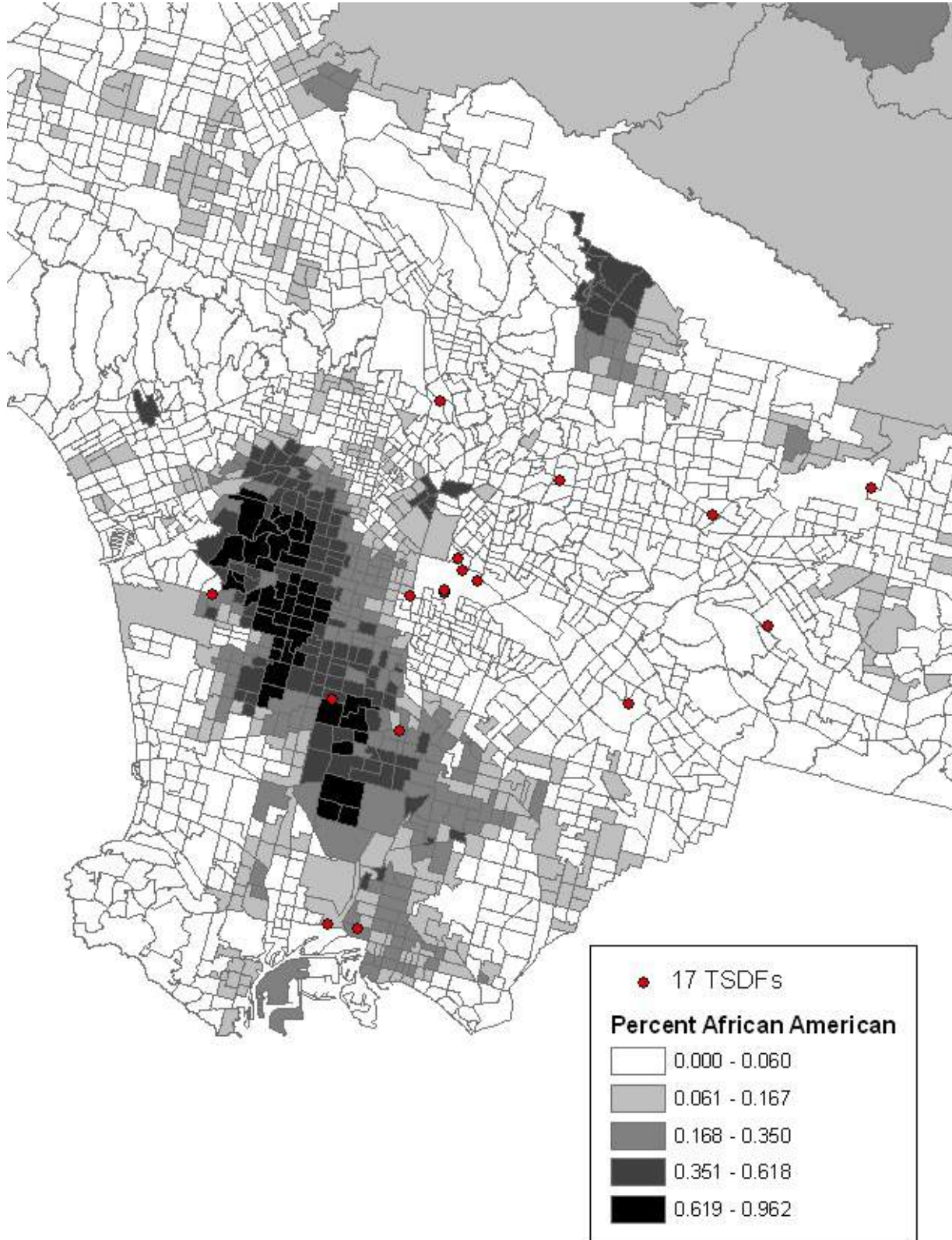


Figure 6-3 Concentration of Hispanics in Los Angeles County and Location of TSDFs

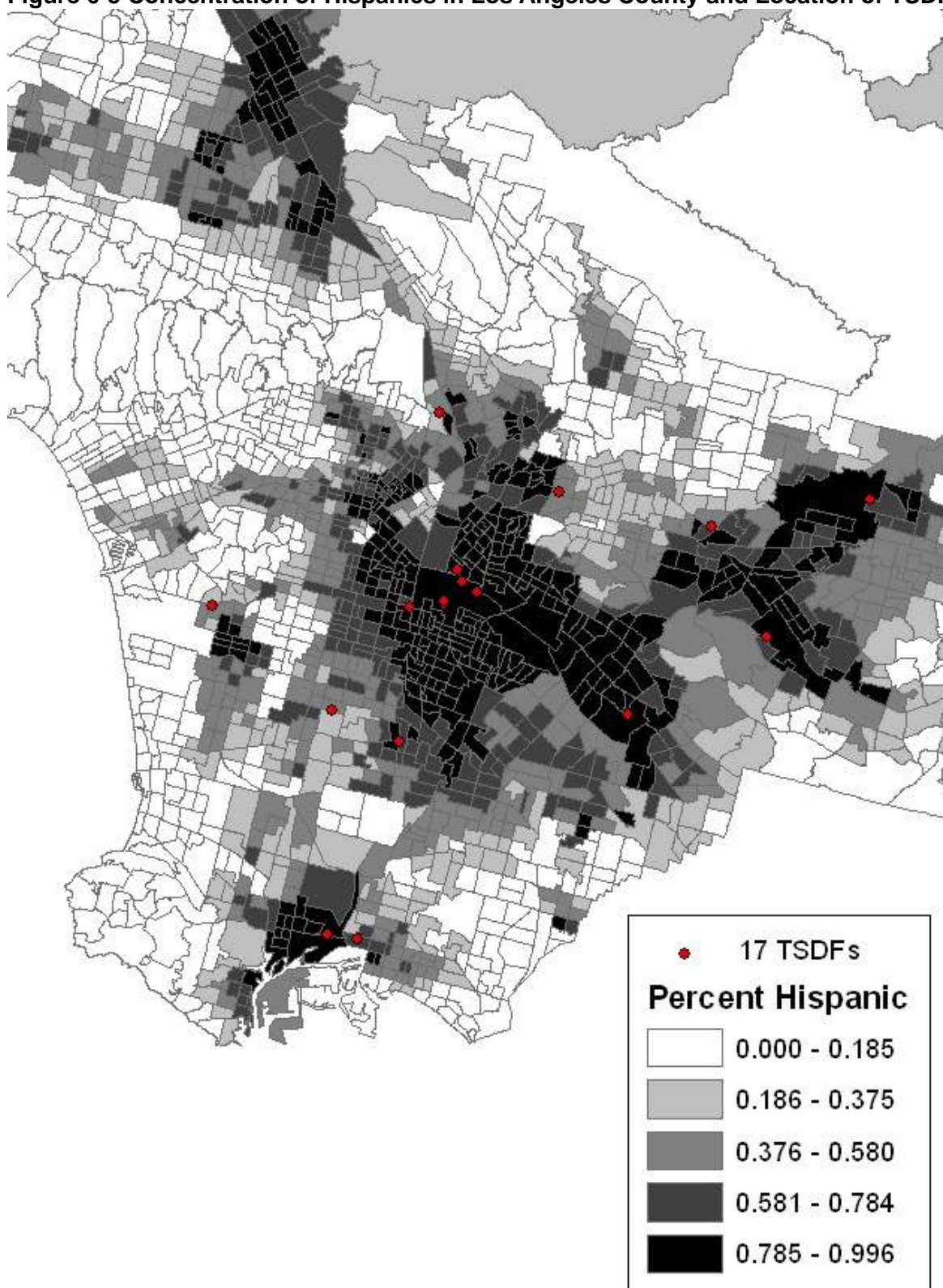


Figure 6-4 Concentration of Households that Do Not Speak English in Los Angeles County and Location of TSDF

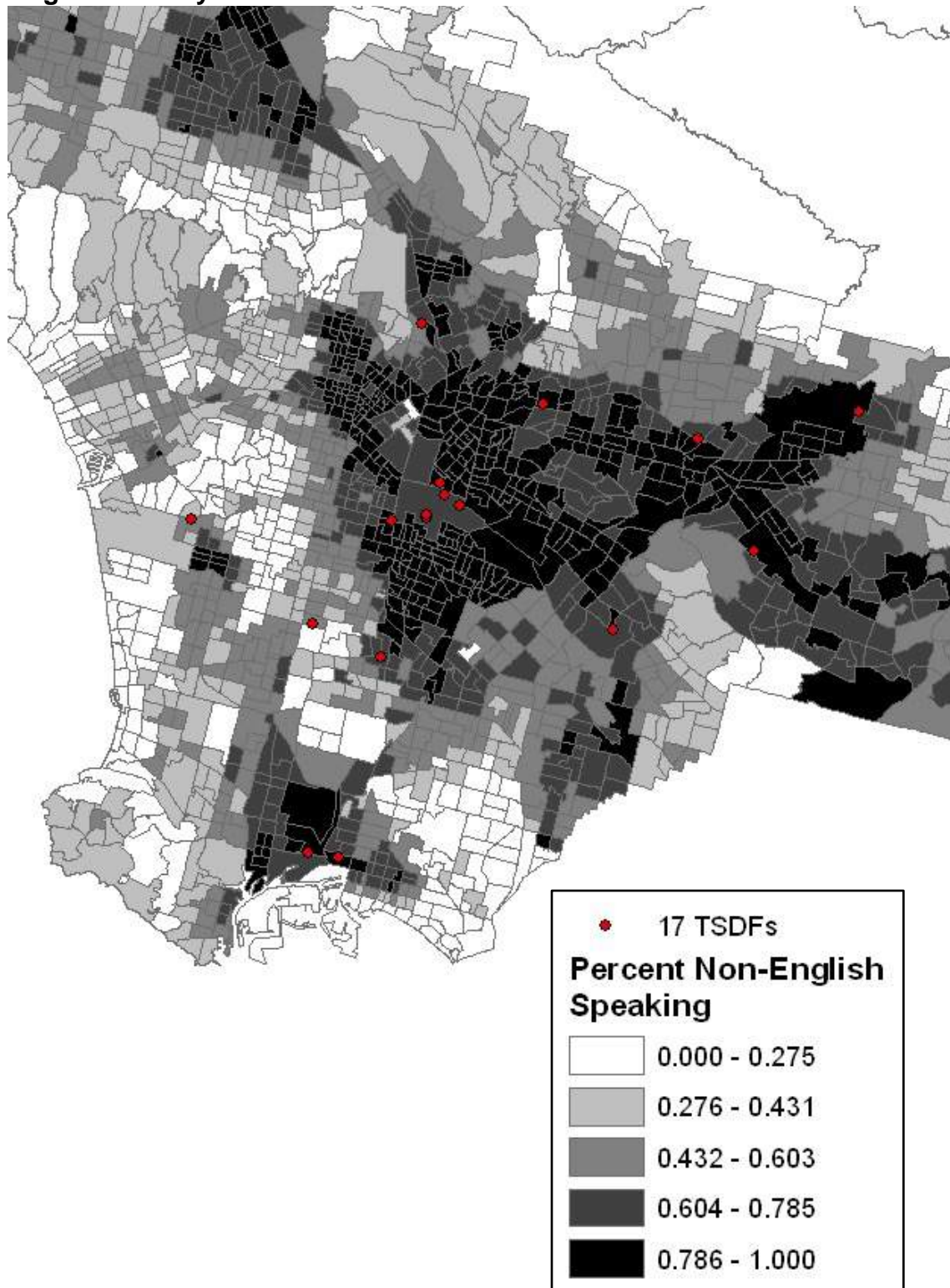
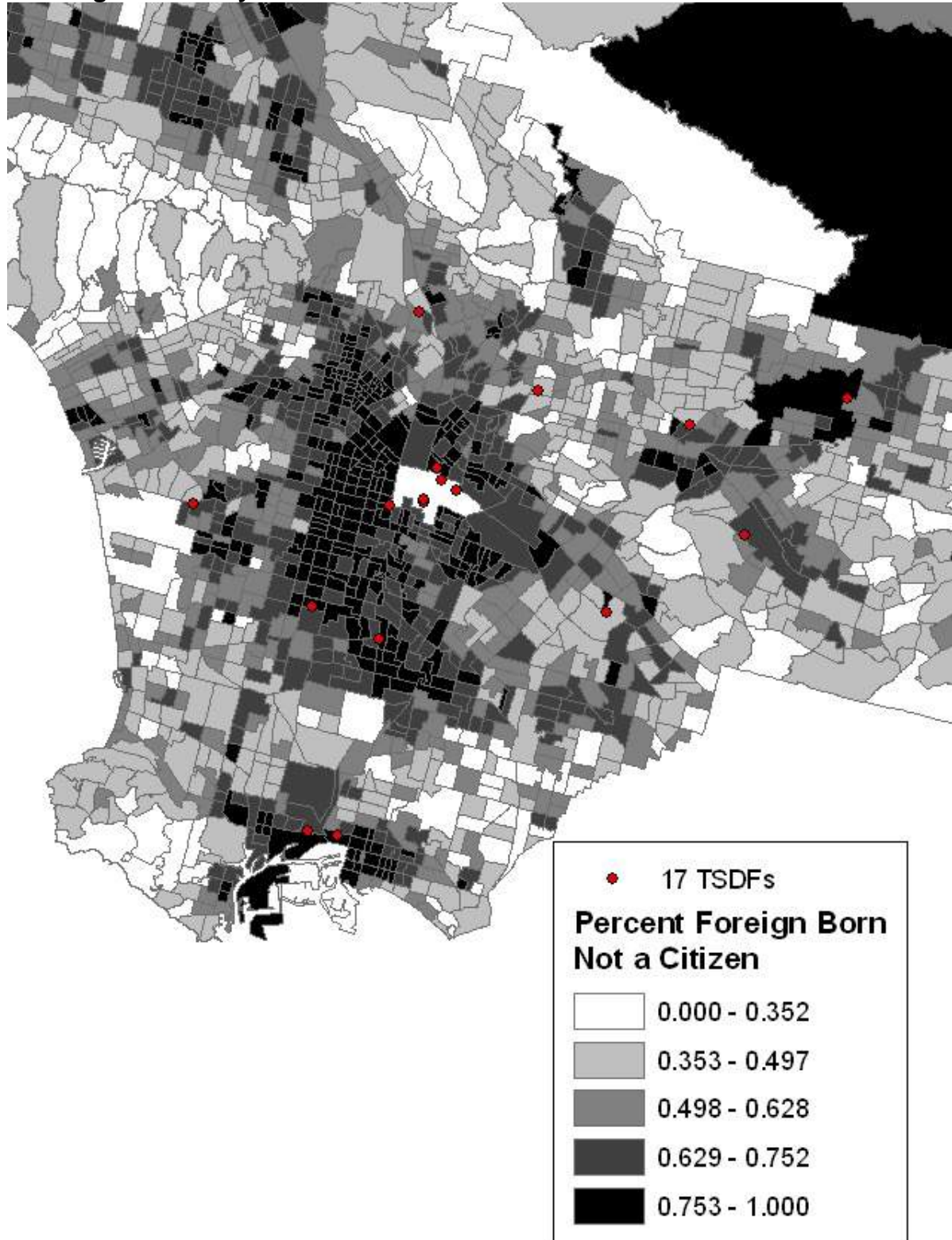


Figure 6-5 Concentration of Foreign-born Population that are Not Citizens in Los Angeles County and Location of TSDFs



6-3 Demographic Makeup of Tracts Surrounding TSDFs in Los Angeles County

Table 6-5 was created by using the areal apportionment method to determine descriptive statistics for the racial, socioeconomic and foreign-born characteristics of the tracts located within and beyond a one, three and five kilometer radii of the hazardous waste facilities. The descriptive statistics for the tracts within and beyond the one, three and five kilometer radii were combined with the descriptive statistics for “all California tracts” and “all Los Angeles tracts” for reference. These descriptive statistics allow us to analyze three main outcomes: 1) Examine the racial, socioeconomic and foreign-born outcomes of increasing the radii surrounding the TSDFs; 2) Analyze the different variable outcomes by comparing the tracts within and beyond a given radii of the hazardous waste facility; and 3) Compare the variable outcomes of the tracts within one, three and five kilometers of the TSDFs with the county average and deduce the lows and highs. For the racial variables, as the radii increases from one to five kilometers, distinct patterns are shown for two of the three racial/ethnic minority populations. The percentage of Hispanics decreases as you move further away from the hazardous waste facility, 71.7%, 66.8% and 62.5%, for 1, 3 and 5 kilometers, respectively. The percentage of Asian/Pacific Islanders moves in the opposite direction going from 7.6%, 9.6% and 11.6%, for 1, 3 and 5 kilometers, respectively. The percentage of African Americans does not show much of a pattern as the radii surrounding the hazardous waste facility increase (12.2%, 13.2%, 12.1%, for 1, 3 and 5 kilometers, respectively). However when comparing these percentages to the percentages in tracts beyond the 1, 3 and 5 kilometer radii (9.6%, 9.1% and 8.4%, respectively), the percentages of African Americans within the 1, 3, and 5 kilometer radii

are higher. This is also true when comparing the percent African American with that of the entire county (9.6%). This shows that there is a higher percentage of African Americans in close proximity to hazardous waste facilities than farther away. The same is true for percent Hispanic. Asian/Pacific Islander percentage in Los Angeles County does not show the same pattern. There is a lower percentage of the Asian/Pacific Islander population in close proximity to the TSDFs than farther away. The socioeconomic variables show very expected outcomes. As the radii surrounding hazardous waste facilities increases, there is a decrease in the percent of persons below poverty, percent of persons unemployed, percent of persons employed in blue collared occupations, and percent of persons without a high school degree. At the same time, there is an increase in the mean household income, the percent of persons employed in white collared occupations and the percent of persons with a four-year college degree. For the foreign-born variables: percent foreign-born, percent foreign-born that is not a citizen, and percent that speak English not well or not at all, the highest percentages for all three variables are at the closest distance to the TSDFs. As you move further away from the facilities, these foreign-born variable percentages decrease. Also these three foreign-born variables, the percentages for tracts within the 1, 3 and 5-kilometer radii of the hazardous waste facility are higher than that of the tracts beyond these radii of the facility. These outcomes show that there are adverse impacts, both socioeconomic and foreign-born in relation to being in close proximity to a hazardous waste facility. The areas closely surrounding hazardous waste facilities are at a greater disadvantage where the inhabitants have lower educational attainment,

more working class jobs, lower incomes, lower English proficiency and higher foreign-born populations.

In order to show the statistical significance and significant associations between the location of hazardous waste facilities (TSDF) and the racial, socioeconomic and foreign-born conditions, a correlation matrix was created (Table 6-6). A correlation matrix can only analyze whether or not there is a strong relationship between two variables. As the Pearson's R gets closer to one we can assume there is a stronger relationship between the two variables and the 3 stars next to the Pearson's numbers indicated the level of statistical significance. Three stars indicate $p > 0.001$. From the correlation matrix in Table 6-6 we can see that amongst the racial variables, the Hispanic variable has a relatively stronger relationship amongst the other racial variables to the hazardous waste facilities. For the socioeconomic variables, people of blue collared occupations and people without a high school degree showed the strongest relative relationship to the TSDFs. For the foreign-born variables, the non English-speaking variable showed the strongest relationship to the location of hazardous waste facilities relative to the other foreign-born variables.

Table 6-5 Descriptive Statistics for 2000 US Census Tracts for Race, Socioeconomic, and Foreign-Born Variables with Circular Buffers of 1, 3 and 5 Kilometer Radii from 17 TSDFs in Los Angeles County

	All LA Tracts	1km Circle	3km Circle	5km Circle	All Areas Beyond 1km	All Areas Beyond 3km	All Areas Beyond 5km
Total Population	9,519,338	112,664	1,227,601	3,146,578	9,406,674	8,291,737	6,372,760
Racial Variables							
% African American	9.6%	12.2%	13.2%	12.1%	9.6%	9.1%	8.4%
% Asian/Pacific Islander alone	12.2%	7.6%	9.6%	11.6%	12.3%	12.6%	12.5%
% Hispanic	44.6%	71.7%	66.8%	62.5%	44.3%	41.3%	35.7%
Socioeconomic Variables							
Mean Household Income	\$61,811	\$44,066	\$45,079	\$46,270	\$61,978	\$63,804	\$67,953
% Persons below Poverty Level	17.9%	26.0%	25.0%	24.1%	17.8%	16.9%	14.9%
% Persons Unemployed	8.2%	11.7%	10.7%	10.4%	8.2%	7.9%	7.3%
% White Collar Occupations	34.3%	18.9%	21.5%	23.2%	34.4%	35.9%	38.7%
% Blue Collar Occupations	23.3%	37.6%	35.5%	32.9%	23.1%	21.8%	19.4%
% Persons 25 yrs and over w/o HS Degree	30.1%	52.9%	48.3%	44.9%	29.9%	27.7%	23.7%
% Persons 25 yrs and over w/ 4 Yr College Degree	24.9%	9.7%	12.1%	13.9%	25.0%	26.5%	29.7%
Foreign-Born Variables							
% Foreign-born	36.2%	43.4%	42.6%	42.4%	36.1%	35.3%	33.2%
% Foreign-born that is Not a Citizen	22.5%	30.7%	29.2%	28.3%	22.4%	21.5%	19.6%
% Speak English Not Well or Not at All	15.9%	25.9%	24.2%	22.9%	15.8%	14.7%	12.5%

Table 6-6 Correlation Matrix Pearson R Between Tracts Located 50% within 1, 3 and 5 Kilometers of TSDFs and Racial, Socioeconomic and Foreign-Born Variables in Los Angeles County

	N = Number of Tracts	Tracts 50% w/in 1km of 17 TSDFs ^a	Tracts 50% w/in 3km of 17 TSDFs ^b	Tracts 50% w/in 5km of 17 TSDFs ^c
Racial Variables				
% African American	2047	.010	.086 ***	.122 ***
% Asian/Pacific Islander	2047	.038	.061 *	.040
% Hispanic	2047	.112 ***	.308 ***	.458 ***
Socioeconomic Variables				
Mean Household Income	2041	.056 **	.186 ***	.310 ***
% Persons below Poverty Level	2041	.070 ***	.222 ***	.348 ***
% Persons Unemployed	2041	.048 *	.167 ***	.279 ***
% White Collar Occupations	2040	.098 ***	.271 ***	.426 ***
% Blue Collar Occupations	2040	.119 ***	.323 ***	.456 ***
% Persons 25 yrs and over w/o HS Degree	2047	.123 ***	.321 ***	.472 ***
% Persons 25 yrs and over w/ 4 Yr College Degree	2047	.088 ***	.261 ***	.414 ***
Foreign-Born Variables				
% Foreign-born	2047	.057 **	.176 ***	.282 ***
% Foreign-born that is Not a Citizen	2047	.077 ***	.207 ***	.313 ***
% Speak English Not Well or Not at All	2047	.102 ***	.272 ***	.397 ***
<p>a. Tracts located w/in 1km of TSDF = 1 and Tracts located beyond 1km of TSDF = 0</p> <p>b. Tracts located w/in 3km of TSDF = 1 and Tracts located beyond 3km of TSDF = 0</p> <p>c. Tracts located w/in 5km of TSDF = 1 and Tracts located beyond 5km of TSDF = 0</p> <p>*p>0.05; ** p>0.01; ***p>0.001</p>				

6-4 Conclusion

In conclusion, the results of this chapter show that there is an association between the location of hazardous waste facilities and populations that are of low socioeconomic status and contain residents with foreign-born characteristics. Although racial minorities are impacted by hazardous waste facilities, not all, racial minorities are affected in the same manner in Los Angeles County. There is a distinct typology of association that exists with respect to race, socioeconomic characteristics, and foreign-born characteristics. Also, when analyzing tracts based on the racial composition of one predominant race at a time (i.e. tracts that are predominantly African American), examining tracts in their entirety without implementing the racially parsed dataset method, can lead to errors in the results. This is due to the predominance of certain tracts having uniformly heterogeneous racial composition where although one tract may be by percentage one predominant race, the second most represented race is close behind in percentage (ie. a tract that is 45% African American, 30% Hispanic and 15% Asian). Especially in Los Angeles County where the population is so diverse, many of the tracts are composed of roughly equal levels of different minorities: African American, Hispanic, and Asian. When concentrating on the effects of subgroup differences, including such tracts in the analysis could cause false outcomes since it would be difficult to classify that particular tract as not being affected by the other minority races that also significantly compose that tract. The “racially parsed dataset” method was implemented and based on this a typology of race, socioeconomic, and foreign-born characteristics. African Americans, while they are of low socioeconomic status exhibit low foreign-born characteristics, and reciprocally, Asian Americans are of high socio-

economic status, but also exhibit high foreign-born characteristics. Hispanics were found to be both of low socioeconomic status and of low foreign-born characteristics—two traits that make the population vulnerable to exposure to environment hazards. The results also showed that in line with the hypothesis that the racial minorities with both unfavorable traits, that is, low socioeconomic status coupled with high foreign-born status, would be the most marginalized groups. In Los Angeles County, it was shown that the Hispanic population had a higher likelihood of living near hazardous waste facilities than both the African Americans and Asians that exhibited just one of the two vulnerable traits.

This study hypothesizes that this outcome is influenced by the fact that African Americans, though a racial minority in the United States do not necessarily have as many adverse traits as other racial minorities that are immigrants. Immigrants, in addition to dealing with issues arising from being a racial minority, including low socioeconomic status, must deal with additional variables of difficulty assimilating due to their foreign-born characteristics. This study has further found that there are higher foreign-born populations closer to a hazardous waste facility than further away and a higher percentage of both non-citizens and non-English speaking populations proximate to the hazardous waste facilities than further away.

The subsequent chapter will go into greater detail of the foreign-born characteristics and their relationship to the proximity of hazardous waste facilities by conducting statistical analyses determining if the foreign-born variables hold true when controlling for all other variables.

CHAPTER SEVEN:
CROSS-SECTIONAL ASSESSMENT OF PRESENT-DAY DISPARITIES BASED ON
RACIAL, SOCIOECONOMIC AND FOREIGN-BORN CHARACTERISTICS OF
NEIGHBORHOODS ADJACENT TO TSDFS IN 2000

Many studies have looked at the racial and socioeconomic characteristics of neighborhoods adjacent to hazardous waste facilities. However, there are few studies that have conducted a cross-sectional analysis of these neighborhoods looking at the racial and socioeconomic characteristics in addition to an emphasis of foreign-born characteristics. The evidence of “present day” racial and socioeconomic disparities has been looked at in great detail. Many studies have assessed whether variables such as race, income, education, property value and housing disparities in the location of hazardous waste facilities have existed. These studies have often found that race has been a predominant factor as a predictor in the placement of hazardous waste facilities throughout the United States (e.g. Been 1994; Been 1995; Mohai and Bryant 1992; Hamilton 1995; Pollock and Vittas 1995; Been and Gupta 1997; Boer et. al., 1997; Hird and Reese, 1998; Boone and Modarres, 1999; Lejano and Iseki, 2001; Pastor et al. 2001; Pastor et al. 2004; Ringquist 2005).

Further, environmental justice scholars have developed theoretical explanations as to why hazardous waste facilities are so often found in impoverished and minority neighborhoods (e.g. Mohai and Saha 2007; Saha and Mohai 2005). Detailed results of these and other studies have been delineated in the prior theoretical review chapters of this dissertation. This study seeks to investigate more deeply, the impacts of foreign-

born characteristics on environmental disparities. However, the study does not seek to discount or overturn the fact that race is a predominant factor in the predictor of the placement of hazardous waste facilities throughout the US. As a matter of fact, it is still hypothesized, that race is a predominant factor in the placement of hazardous waste facilities. However this analysis seeks to investigate what sorts of added impacts, if any, foreign-born characteristics will have in the presence of both race and socioeconomic variables.

To add to the existing scholarship, this chapter looks at the cross-sectional analysis of 2000 census tract data by specifically examining the foreign-born characteristics of the populations surrounding these areas on top of the race and socioeconomic variables that have been examined in the past. Present-day disparities can be the result of the persistence over time of disparities that began prior to the time of siting, of disparities that developed after siting, or disparities that were present at the time of siting that have become exacerbated over time. When looking at present-day siting, as examined in past studies, we are able to assess the impact of the contributory factors by which disparities developed based on race and socioeconomic variables and see if such factors as being a minority or of low-income status have or had an effect. An understanding of present-day inequities with an emphasis on foreign-born characteristics looks at newer variables that have become more prominent over more recent years. Being a racial minority and/or being of low socioeconomic outcomes, have been variables that have commonly been accepted as characteristics of marginalized populations continuously throughout all decades. However, in more recent decades there has been a preeminence of large waves of immigrant populations

coming from different countries. These immigrants, or foreign-born populations, also bring with them, different cultural and linguistic backgrounds that could significantly impede assimilation into the mainstream population and may serve as contributory factors to inequities. For this reason, a population marked by high levels of foreign-born characteristics, especially unassimilated foreign-born groups, may be correlated to environmental disparities. This can lead to the theory that marginalization of a given population in the United States may not just be limited to race and income. Looking at the assessment of such foreign-born traits in addition to the racial and socioeconomic conditions of neighborhoods adjacent to hazardous waste facilities, may offer a newer baseline perspective of processes and contributory factors by which such disparities came about.

This chapter will look specifically at these foreign-born traits in addition to the racial and socioeconomic conditions of neighborhoods surrounding the hazardous waste facilities and assess what characteristics of the foreign-born populations are related to the likelihood of living near environmental hazards. It will perform multivariate statistical analyses to figure out what characteristics predict the location of hazardous waste facilities and namely to see if foreign-born variables are significant predictors when controlling for both race and income. The hypothesis made in this study is that foreign-born variables are in fact significant predictors when race and income are controlled for. When comparing socioeconomic variables vs. foreign-born variables, it is hypothesized that foreign-born variables are a stronger predictor of hazardous waste facilities than socioeconomic variables as the radii from the hazardous waste facilities increase from 1km to 5km.

The previous chapter looked at the cross-sectional analysis of 2000 census tract data for racial, socioeconomic and foreign-born characteristics of neighborhoods in close proximity to hazardous waste facilities. From this a typology based on race, income and foreign-born characteristics was created. For instance it was found that African Americans were of low-income and low foreign-born characteristics while Hispanics were of low-income and high foreign-born characteristics. It was also identified that Asians were of high-income and high foreign-born characteristics. In Los Angeles County, although both Asians and Hispanics were of high foreign-born characteristics, Asians were more assimilated than Hispanics in that a higher percentage of foreign-born Asians were naturalized citizens and a lower percentage of them were non-English speaking than Hispanics. This distinction delineates that even amongst the foreign-born racial minority groups, there is a difference between those that are more assimilated (Asians in Los Angeles County) and less assimilated (Hispanics in Los Angeles County). Based on these results, it can be hypothesized that even between the two groups of foreign-born populations, there is a distinction that there will be a more negative impact on the less assimilated foreign-born groups as opposed to the more assimilated ones. Furthermore, these results can lead to the hypothesis that not all racial minority groups are affected the same. In other words, the minority versus non-minority discourse on this subject by scholars can be further divided and classified according to the intricate racial subgroups. These minority subgroups are marked by different characteristics than the ethnic group, which could lead to differences in marginalization amongst the subgroups. In this research, four hypotheses can be made based on this inference: 1) Races marked by both low income

and high foreign-born characteristics will be a stronger predictor of hazardous waste facilities than races marked by high income/low foreign-born; 2) Races that do not exhibit neither low income nor high foreign-born characteristics will be the least impacted by hazardous waste facilities; 3) For races that only exhibit one of the two characteristics (between low income and high foreign-born), races that show high foreign-born characteristics will be a stronger predictor than races with low-income; 4) For races that are of foreign-born populations, races that are less assimilated will be a stronger predictor of location of hazardous waste facilities than would foreign-born populations with more assimilated characteristics.

This chapter will briefly cover the data and methods below. A more detailed version of the data and methods is discussed in Chapter 5. The results of this section will also explain the demographic data of the neighborhoods surrounding the hazardous waste facilities. It will also conduct bivariate and multivariate analyses of hazardous waste facilities with a focus on closely examining the foreign-born variables.

7-1 Data and Methods

For this part of the study, 2000 census tract data were used to analyze tracts in Los Angeles County surrounding the locations of TSDFs. In order to accurately consider whether racial, socioeconomic and foreign-born characteristic disparities exist surrounding hazardous waste facilities, circular host neighborhood areas of 1, 3 and 5-kilometer radii surrounding the hazardous waste facilities were drawn. These circular buffers of varying radii constitute the host neighborhoods and non-host areas are areas beyond the 1, 3 and 5 kilometer radii from the facility. The areal apportionment method

was used to analyze the demographic data surrounding the facilities. A detailed explanation of the areal apportionment method is offered in Chapter 5, which is the methods chapter of this dissertation.

In order to further assess the impact of the relationship between the location of hazardous waste facilities and the effects of racial, socioeconomic, and foreign-born characteristics, the second part of this chapter explores the interactions between racial subgroups and socioeconomic status in the present-day location of hazardous waste facilities. The census data offered variables for below poverty, income, and education data separated by each individual race. These variables were used to make associations between race and the location of TSDFs distinguished by socioeconomic status. Because the census data does not offer any foreign-born variables distinguished by race, such as for example, the number of Hispanics that are foreign-born (the census only has a category for the total “foreign-born” in the entire population, not one stratified by race), the interactions of foreign-born characteristics vs. racial subgroups could not be examined in as much detail as the interactive effects of race and socioeconomic status. The only foreign-born variable available in the census that could be separated by racial subgroup, was the language variable, in that there were variables for persons that speak “Spanish and speak English not well or not at all,” and “persons that speak Asian/other language and speak English not well or not at all.” Through these methods, interactions were assessed by examining differences in the relative likelihood of living in a TSDF host neighborhood between non-minorities and minorities by subgroup of low socioeconomic status versus those of high socioeconomic status. Interactions of race and language were also assessed by examining the

differences in proximity to a TSDF host neighborhood amongst high foreign-born characteristic minorities (Hispanics and Asians) by language. The raw numbers for each of the race, socioeconomic and foreign-born variables were extracted and used to calculate what percentage of the total variable was included in the 3-kilometer radius surrounding a facility. As an example, of the total number of non-Hispanic Whites in Los Angeles County, how many of them resided within the 3-kilometer radius zone? A percentage was calculated by dividing the number of people that were contained in the tracts within a 3-kilometer radius of the facility by the number of people in the total 2057 tracts in Los Angeles County and multiplying this by 100. These calculations gave rise to percentages that would allow one to compare between the different variables to see how the demographic composition of the 3-kilometer circular buffer surrounding a hazardous waste facility compares with each other.

For the statistical analysis, a series of logistic regression models were employed. The dependent variable is dichotomous coded as either a “0,” if a tract is at least 50% NOT contained within the 1, 3, or 5 kilometer buffers or a “1,” if a tract is at least 50% contained within the 1, 3, or 5 kilometer buffers. The independent variables include the three categories: racial, socioeconomic and foreign-born (see Appendix B for detailed information and construction of these variables). The first set of logistic regressions were conducted in a step-wise fashion using the entire dataset of Los Angeles County tracts, with each successive model testing for more variables. For instance the first model looks at the relationship of race with the location of hazardous waste facilities. Next, the socioeconomic variables are added to the model, followed by the foreign-born variables. The second set of logistic regressions will implement the

“racially parsed dataset” which attempts to isolate out the tracts with a high percentage of a single race/ethnic group. Using these racially stratified datasets, socioeconomic and foreign-born variables are tested as predictors of the location of hazardous waste facilities and the results compared across the different races. In the selection of variables, because there was evidence of multicollinearity, a specific elimination scheme of variables was employed based on the correlation matrix (Table 7-1). The correlation matrix can be used to look at each of the independent variables to see how much they correlate. A value of “1” indicates a total correlation and the closer to “1” the more the two variables are likely to be correlated. Multicollinearity occurs with regression analysis when there is a high correlation if at least one independent variable with a combination of the other independent variables. When looking at the correlation matrix (Figure 7-1), one can examine each of the independent variables that correlate above a certain level close to 1. In this study, variables from the model that cause a correlation of 0.75 or above are eliminated. Multicollinearity can cause the variables in the model to behave erratically, such as in some cases when highly correlated independent variables are placed in the same model, there can be directional changes for some of the coefficients of variables in the model (Gujarati 1995). For this reason, a limited number of variables are introduced in the multivariate models.

In terms of the race variables, the Hispanic variable is highly correlated with almost all of the occupational and education variables. They are also highly correlated with the foreign-born variables. Occupational variables and educational variables are highly correlated with each other. Therefore, only one of the two categories of variables was used. To deal with the multicollinearity problems associated with the Hispanic

variable, the variable for non-whites, or more specifically, “N=non-Whites of a single race excluding some White Hispanics” was used when other socioeconomic or foreign-born variables are introduced into the regression. In end, the list of socioeconomic and foreign-born independent variables was as follows: For socioeconomic variables, “Mean household Income,” “Percent Unemployed in the Civilian Labor Force,” “Percent in blue collared occupations.” For foreign-born variables, “Percent Foreign-born of Total Population,” “Percent Foreign-born Non-Citizens of Foreign-born Population,” and “Percent Use Non-English Language at Home-Speak English Not Well or Not At All.”

7-2 Results and Analysis

Table 7-2 lays out the descriptive statistics for Los Angeles County including the descriptives of specific socioeconomic variables divided by race. This table examines the demographics of the 2000 census tracts surrounding a 3-kilometer circular radius of the hazardous waste facilities and compares this to the tracts beyond the 3-kilometer radius. The table also includes the percentages for the entire County of Los Angeles as a comparison. The racial subgroup breakdowns allow us to see that in Los Angeles County, all minority races are not affected the same way by hazardous waste facilities. A cross sectional analysis of the 2000 census tracts in Los Angeles County demonstrates the Hispanic population is the most greatly impacted group with the highest percentages within the host neighborhoods containing TSDFs at 66.84%. Next are the African Americans at 13.18% and last are the Asians at 9.27%. As a matter of fact, Asians, though a minority race, follow the same trends as the White population as more Asians live beyond the 3km radius of a TSDF rather than within. African

Americans and Hispanics follow a similar trend there are higher percentages of both groups living within the 3km radius of a TSDF than beyond. Based on the race vs. socioeconomic and foreign-born characteristic typology developed in the previous chapter, these descriptive results point to the fact that minorities with low foreign-born characteristics and low socioeconomic characteristics are impacted more than minorities that are of high foreign-born characteristics and high socioeconomic characteristics. Perhaps this might suggest that income plays a bigger role than foreign-born characteristics. However, we cannot definitively conclude upon these facts, since in Los Angeles County, not all foreign-born minority groups share the same traits. For instance, it was found that Asians in Los Angeles County are much more assimilated in terms of English language proficiency and citizenship than the Hispanics (explained in detail in the previous chapter). It may be that although both Asians and Hispanics are foreign-born populations, Asians do not suffer as much from the debilitating aspects of being unassimilated foreign-born than Hispanics who seem to be more unassimilated in Los Angeles County. In fact, given that many of the Asians in Los Angeles County are more assimilated, they may be closer in their trajectories to non-Hispanic Whites given that Asians overall exhibit higher socioeconomic characteristics.

Socioeconomically, in the host neighborhoods within 3km of the TSDF, there are greater people below-poverty, 24.97% vs. 16.86% beyond, more unemployed persons, 10.69% vs. 7.92% beyond, more people without a high school degree, 43.30% vs. 27.72% beyond, more people with blue collared jobs, 26.29% vs. 19.83% beyond and a much lower mean household income, \$44,953 vs. \$63,804 beyond. The neighborhoods hosting hazardous waste facilities are generally socioeconomically depressed. When

looking at specific racial subgroups, each of the races has a higher below poverty percentage within the 3-kilometer circle of the facilities than beyond. Each racial subgroup also has a lower percentage of persons with a four-year college degree or higher around the 3-kilometer host neighborhoods than beyond. This is not only true for the minority races, but also for non-Hispanic Whites as well.

Examining the foreign-born variables shows that within the 3-kilometer radius of the TSDFs, there were higher foreign-born populations, 42.63% within vs. 35.29% beyond the 3-kilometer radius and higher non-citizens of the total population, 29.22% within vs. 21.46% beyond. There was a higher percentage of non-English speaking populations overall, 21.48% within vs. 12.23% beyond. However when looking at the non-English speaking population by subgroup, the “only Asian language speaking populations” were lower in the 3-kilometer host areas of the facilities at 2.71% within and 3.32% beyond. The opposite was true for the “only Spanish speaking” non-English speakers as they showed a 18.76% within vs. 9.90% beyond the 3-kilometer regions hosting the TSDFs. There is almost double the number of non-English speaking Spanish populations within the host neighborhoods than outside. This is an interesting outcome as it shows that even within the foreign-born minority populations, there are subgroup differences. As expected, Asians in Los Angeles County are not as disproportionately impacted as Hispanics, whom are the most heavily hit, even though both groups are considered to be foreign-born minorities. Hispanics were subjected to the greatest degree of environmental disparities according to the analyzed data.

In order to better compare differences between racial groups the next section looks at the possible interaction between race and socioeconomic status. It would be

interesting to see whether any interactions existed between race and socioeconomic status, which would result in disparities for one factor only when certain conditions are met for the other factor. A more detailed explanation of this is offered below in section 7-2-1.

Table 7-1 Correlation Matrix for Independent Variable

Correlations

	% Black Alone	% Asian-Pacific Islander Alone	% Hispanic	% Persons below Poverty Level in 1999	Log of Mean Household Income	% Unemployed in Labor Force	% 16 Yrs & Over in Management, Professional, and Related Occs	% 16 Yrs & Over in Const., Equip., Maint., Prod., Trans., & Moving Occs	% Persons 25 Yrs & over w/ 4 Year College Degree	% Use Non-Engl. language at home - Speak Engl. Not Well or Not at All	% Foreign-Born Natives of Total Pop	% Foreign-Born Non-Citizens of Total Pop
% Black Alone	1											
% Asian-Pacific Islander Alone	-.046** 7036	1										
% Hispanic	-.046** 7036	-.199** 7036	1									
% Persons below Poverty Level in 1999	.041** 7036	-.199** 7036	-.199** 7036	1								
Log of Mean Household Income	.291** 7036	-.120** 7036	-.120** 7036	-.120** 7036	1							
% Unemployed in Labor Force	-.046** 7036	-.199** 7036	-.199** 7036	-.199** 7036	-.199** 7036	1						
% 16 Yrs & Over in Management, Professional, and Related Occs	.291** 7036	-.120** 7036	-.120** 7036	-.120** 7036	-.120** 7036	-.120** 7036	1					
% 16 Yrs & Over in Const., Equip., Maint., Prod., Trans., & Moving Occs	.291** 7036	-.120** 7036	-.120** 7036	-.120** 7036	-.120** 7036	-.120** 7036	-.120** 7036	1				
% Persons 25 Yrs & over w/ 4 Year College Degree	.291** 7036	-.120** 7036	-.120** 7036	-.120** 7036	-.120** 7036	-.120** 7036	-.120** 7036	-.120** 7036	1			
% Use Non-Engl. language at home - Speak Engl. Not Well or Not at All	.291** 7036	-.120** 7036	-.120** 7036	-.120** 7036	-.120** 7036	-.120** 7036	-.120** 7036	-.120** 7036	-.120** 7036	1		
% Foreign-Born Natives of Total Pop	.291** 7036	-.120** 7036	-.120** 7036	-.120** 7036	-.120** 7036	-.120** 7036	-.120** 7036	-.120** 7036	-.120** 7036	-.120** 7036	1	
% Foreign-Born Non-Citizens of Total Pop	.291** 7036	-.120** 7036	-.120** 7036	-.120** 7036	-.120** 7036	-.120** 7036	-.120** 7036	-.120** 7036	-.120** 7036	-.120** 7036	-.120** 7036	1

** Correlation is significant at the 0.01 level (2-tailed).

Table 7-2 Descriptive Statistics for Racial, Socioeconomic, and Foreign-born Variables for 3km Radius from a TSDf for 2000 Census Tracts using the Areal Apportionment Method

2000 Census Tracts	All LA County Tracts	3km Circle for 2000	Beyond 3km 2000
Total Population	9,519,338	1,227,601	8,291,737
Population Density	2,344	9,038	2,113
RACIAL VARIABLES			
% White alone	30.95%	9.14%	34.18%
% African American alone	9.63%	13.18%	9.11%
% Asian/Pacific Islander alone	12.20%	9.27%	12.06%
% Hispanic	44.58%	66.84%	41.28%
SOCIOECONOMIC VARIABLES			
Mean Household Income	\$61,811	\$44,953	\$63,804
% Persons below Poverty Level	17.91%	24.97%	16.86%
% NH White Below Poverty	8.52%	12.75%	8.35%
% African American Below Poverty	24.38%	28.69%	23.44%
% Asian/Pacific Islander Below Poverty	13.94%	16.71%	13.62%
% Hispanic Below Poverty	24.19%	27.18%	23.47%
% Unemployed in Civilian Labor Force	8.23%	10.69%	7.92%
% Employed in Management, Professional, and Related Occupations	34.33%	21.45%	35.89%
% Employed in Prod, Transportation, and Material Moving Occupations	20.53%	26.29%	19.83%
% Persons 25 yrs and over w/o HS Degree	30.10%	48.30%	27.72%
% Persons 25 yrs and over w/ 4 Yr College Degree	24.86%	12.10%	26.52%
% NHW Persons w/4 Yr College Degree+	37.71%	28.31%	38.10%
% African Am w/4 Yr College Degree+	17.84%	12.83%	18.87%
% API Persons w/4 Yr College Degree+	42.38%	31.12%	43.66%
% Hispanic w/4 Yr College Degree+	6.79%	4.32%	7.35%
FOREIGN-BORN VARIABLES			
% Foreign-born	36.24%	42.63%	35.29%
% Persons 5+ that Speak Spanish and Speak English Not Well or Not at all	11.04%	18.76%	9.90%
% Persons 5+ that Speak Asian/Other Lang and English Not Well or Not at all	3.24%	2.71%	3.32%
% Persons 5+ that Speak English Not Well or Not at all	14.29%	21.48%	13.23%
% Not a US Citizen of Foreign Population	61.97%	68.53%	60.80%
% Not a US Citizen of Total Population	22.46%	29.22%	21.46%

7-2-1 Interactions between Race and Socioeconomic Status

This section addresses the interactions between race and socioeconomic status with a consideration of racial minority subgroups in the present-day location of hazardous waste facilities. The interactions will allow us to assess whether or not there is an association between race and the location of TSDFs that differs with regard to socioeconomic status. In this accord, interactions can exist when the relationship between two racial groups of one socioeconomic status level is not parallel to the relationship between the same two racial groups of another socioeconomic status level.

By looking at interactions we would be able to assess the differences in the relative likelihood of living near a TSDF between minorities of low socioeconomic status versus those of high socioeconomic status. If the extent to which low socioeconomic status minorities was greater than the degree to which high socioeconomic status minorities would be impacted by TSDF proximity, then an interaction between race and socioeconomic status would be in effect. Contrary to this, if there were consistent differences between all racial groups across different socioeconomic status levels this would indicate no interaction. It was hypothesized that all minority groups would not exhibit the same outcomes and that while compared to whites, high socioeconomic status would not confer the same level of immunity from living proximate to a TSDF, for certain minorities. Even when the minorities were compared with each other, high socioeconomic status would not prevent the same level of immunity from living close to a TSDF for all minorities the same. It was hypothesized that the ratio of the percentage of all minorities (African

American, Hispanics and Asians) of high socioeconomic status to the percentage of all whites of high socioeconomic status in host neighborhoods was greater than the ratio of the percentage of all minorities (African Americans, Hispanics and Asians) of low socioeconomic status to the percentage of all whites of low socioeconomic status in the same neighborhoods. When comparing amongst the minority subgroups, the ratio of the percentage of all Hispanics and African Americans of high socioeconomic status to the percentage of all Asians of high socioeconomic status in host neighborhoods was greater than the ratio of the percentage of all Hispanics and African Americans of low socioeconomic status to the percentage of all Asians of low socioeconomic status in the same neighborhoods.

These hypotheses were tested by determining the percentage of Whites and minority races of low/high socioeconomic status in 3-kilometer radii host neighborhoods amongst all whites and minorities of low/high socioeconomic statuses in Los Angeles County. Poverty rates were used as an indicator of low socioeconomic status and percentages of a four-year college degree and percentages of high-income (\$200,000/year or more) were used as indicators of the relative degree of high socioeconomic concentration in host neighborhoods for the 2000 census.

Table 7-3 shows that for the low socioeconomic measures, 20.96% of all African Americans, 12.29% Asians, and 21.79% Hispanics below poverty level lived within the 3-kilometer host neighborhoods in the year 2000, compared to 5.65% of Whites below poverty level. These data show that Hispanics, African Americans and Asians of low socioeconomic status were in host neighborhoods to a greater degree

than whites of low socioeconomic status. This measure shows that in comparison to whites of low socioeconomic status, minority races of low socioeconomic status have a higher likelihood of being located within close proximity to a hazardous waste facility. In comparing the minority races together, Hispanics of low socioeconomic status have the highest percentages within the host neighborhoods, followed by the African Americans, and Asians, with the lowest percentages within host neighborhoods. The extent to which these minorities of low socioeconomic status were concentrated in host neighborhoods relative to Whites of low socioeconomic status, can be measured by the ratio of the minorities to the Whites. In comparing with all of the White population, ratio of African Americans of low socioeconomic status to Whites of low socioeconomic status is 3.7, Asians to whites is 2.2, and Hispanics to whites is 3.9. In comparison to all Asians of low socioeconomic status, the ratio of African Americans to Asians is 1.7 and Hispanics to Asians is 1.8. For high socioeconomic measures, 14.65% of all African Americans, 5.38% of all Asians, and 13.85% of all Hispanics with high socioeconomic status lived within the 3-kilometer host neighborhoods compared with the 1.61% of whites with high socioeconomic status. The data show that minorities of high socioeconomic status were much more highly concentrated in neighborhoods surrounding TSDFs than were Whites of high socioeconomic status. Comparing high socioeconomic status African Americans to high socioeconomic status Whites, African Americans were 9.1 times more concentrated in host neighborhoods than Whites. The same comparisons with whites for the other two high socioeconomic status minority races are as follows: Asians to Whites is 3.3, and Hispanics to Whites is 8.6. The ratio of

all high socioeconomic status African Americans to high socioeconomic status Asians is 2.7 and high socioeconomic status Hispanics to high socioeconomic status Asians is 2.6. The data show that the extent to which both African Americans and Hispanics of high socioeconomic status were concentrated in TSDF neighborhoods relative to Whites of high socioeconomic status, (9.1 and 8.6, respectively) were much greater than the extent to which Hispanics and African Americans of low socioeconomic status were concentrated in host neighborhoods relative to the white low socioeconomic status population (3.9 and 3.7, respectively). Along these lines, comparing Asians to Whites, similar trends as the Hispanics and African Americans were observed, however the ratios of difference between Asians and Whites were much less (2.2 for low socioeconomic status Asians and 3.3 for high socioeconomic status Asians). From these findings, it is evident that high socioeconomic status may have decreased the likelihood of living near a hazardous waste facility for Whites, but for especially Hispanics and African Americans high socioeconomic status did not equate to a lower likelihood of living near hazardous waste facilities. An interaction between race and socioeconomic status exists. These interactions show that regardless of socioeconomic status, being a minority race causes proximity to host neighborhoods than whites. The combination of being either Hispanic or African American was associated with a much greater likelihood of living near a TSDF than being white and of low socioeconomic status. Figure 7.1 depicts the interaction between race and low socioeconomic status and figure 7.2 depicts the interaction between race and high socioeconomic status. Both figures show that in comparison to the White race, all minority races have a significantly higher degree

of concentration within the neighborhoods in close proximity of TSDFs, regardless of socioeconomic status.

Table 7-3 also looks at the language variable in order to assess whether concentrations of non-English speaking populations were similarly impacted by hazardous waste facility proximity across race. This was assessed to see if both Hispanics and Asians, as the two main minority groups that characterize high levels of non-English speaking populations in comparison to other African Americans, exhibit similar concentrations within TSDF host neighborhoods. The results showed that while there were 21.83% of persons that speak Spanish and do not speak English well or at all, there were 13.38% of persons that speak Asian languages and do not speak English well or at all. A higher concentration of Spanish non-English speakers was concentrated in host areas than Asian non-English speakers. This difference can be due to the fact that Asians generally are of higher overall socioeconomic status than Hispanics as a group. Although these conclusions cannot be definitively made, one conclusion that can be made from this analysis is that in Los Angeles County, the Hispanic population, (as a combination of low socioeconomic characteristics and high foreign-born characteristics) are the most disproportionately impacted populations amongst all other racial and ethnic groups.

Table 7-3: Concentration of All Whites and All Racial Minorities by Socioeconomic Status in 2000 for 3 kilometer radius from TSDF in Los Angeles County

	2000 Tracts Within 3Km
% NH White alone	3.81%
% African American alone	17.65%
% Asian/Pacific Islander alone	9.80%
% Hispanic	19.34%
INCOME	
% Persons Below Poverty Level	18.06%
% NH White Below Poverty	5.65%
% Black Below Poverty	20.96%
% Asian/PI Below Poverty	12.29%
% Hispanic Below Poverty	21.79%
% White families with \$200K+ inc. last year	1.61%
% African American families with \$200K+ inc. last year	14.65%
% Asian Families with \$200K+ inc last year	5.38%
% Hisp./Latino families with \$200K+ inc. last year	13.85%
EDUCATION	
% Persons 25 yrs and over w/ 4 Yr College Degree	5.61%
% NH White Persons 25+ with 4 Yr College Degree or Higher	2.99%
% Black Persons 25+ with 4 Yr College Degree or Higher	12.25%
% API Persons 25+ with 4 Yr College Degree or Higher	7.52%
% Hispanic Persons 25+ with 4 Yr College Degree or Higher	11.86%
LANGUAGE	
% Persons 5+ that Speak Spanish and Speak English Not Well or Not at all	21.83%
% Persons 5+ that Speak Asian/Other Language and Speak English Not Well or Not at all	13.38%
% Persons 5+ that Speak English Not Well or Not at all	19.31%

Figure 7.1: Interaction between Race and Low Socioeconomic Status in Host Neighborhoods for Los Angeles within 3-kilometer radius of a hazardous waste facility (Below Poverty Variable)

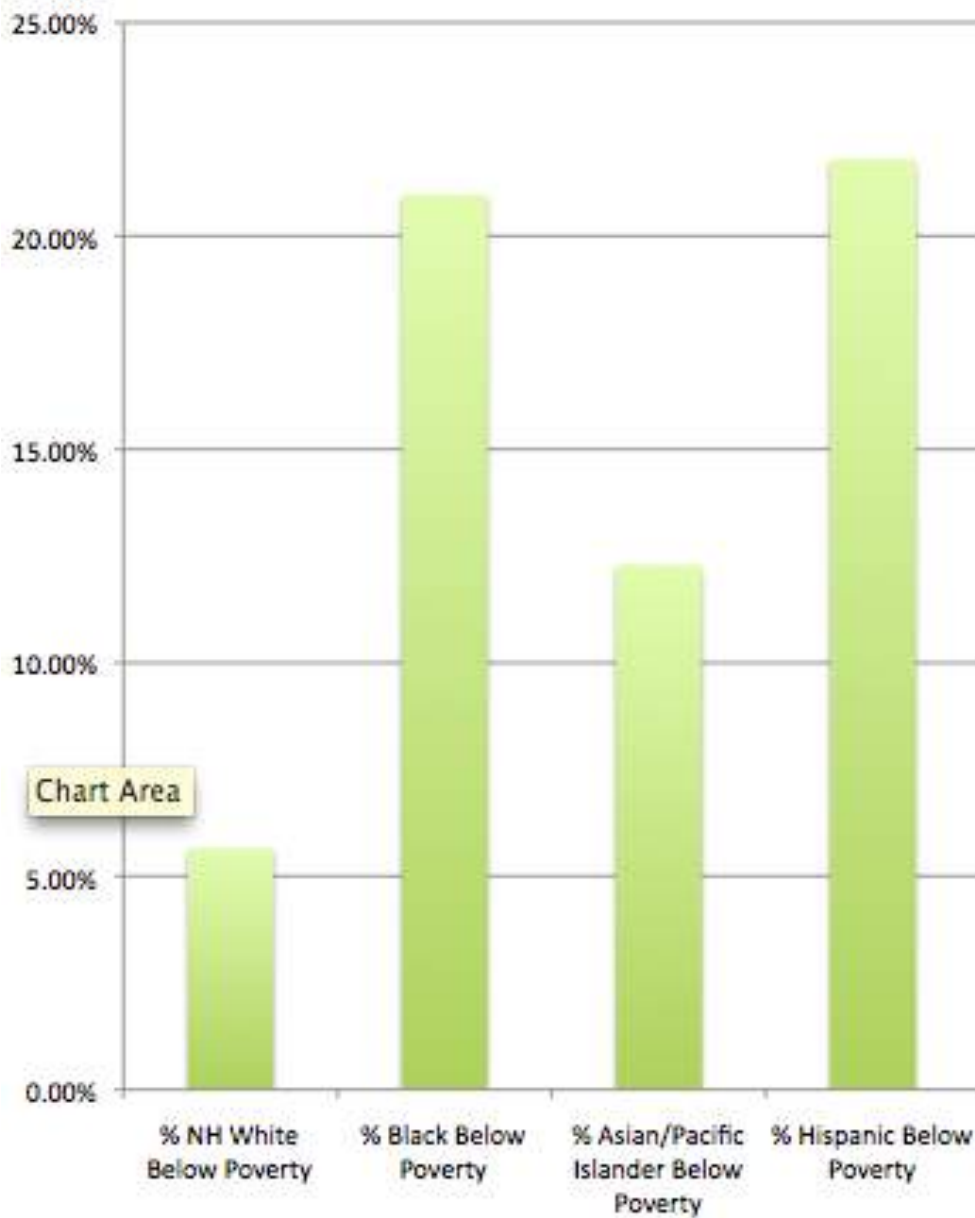
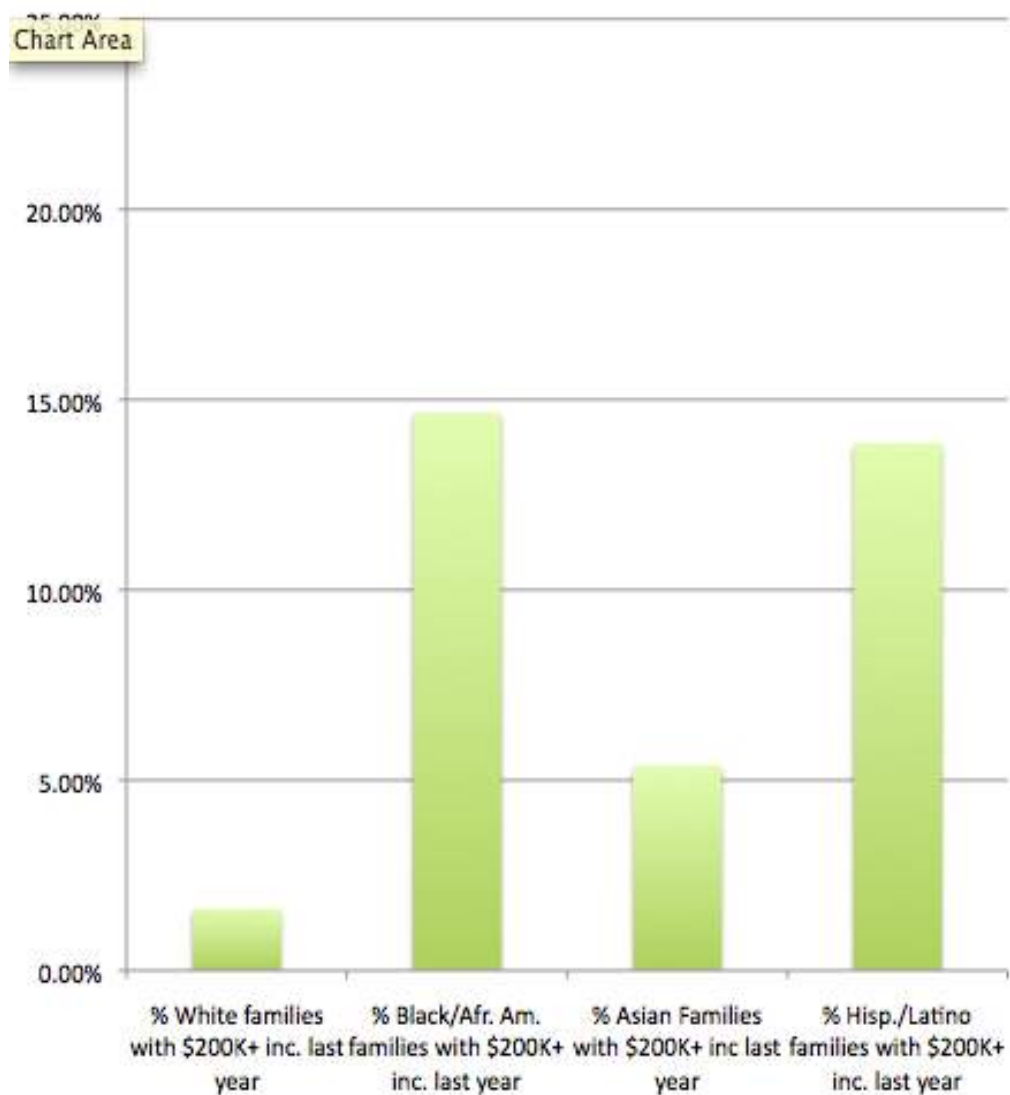


Figure 7.2: Interaction between Race and High Socioeconomic Status in Host Neighborhoods for Los Angeles within 3-kilometer radius of a hazardous waste facility (High Income Variable)



7-2-2 Multivariate Analysis

The analysis thus far has found that in Los Angeles County, Hispanics have the highest percentage of living proximate to TSDFs, followed by African Americans. Asians are not as gravely impacted according to the data. One thing that can be inferred from these outcomes is that the racial variables are not likely to be the only independent factors associated with the location of hazardous waste facilities and are likely affected by socioeconomic or foreign-born variables. If race was in fact the only driving predictor behind the location of hazardous waste facilities, the outcomes would show all racial minorities to behave similarly in comparison to the Whites. This was clearly not the case as some of the trends that were shown in previous sections of this chapter show that Asians are closer in their outcomes to Whites, (an example of this can be seen in the percentage of Asians with a 3 kilometer radius of a TSDF was lower than beyond, similar to the trend for whites in Table 7.1) than with either Hispanics or African Americans. In order to better assess the significance of each variable in predicting the location of hazardous waste facilities in Los Angeles County, logistic regressions were performed. Due to a high degree of multicollinearity within the census data, it was quite challenging to find the right variables that could serve as proxies for what we were seeking to explain without jeopardizing the accuracy of the results. For instance, the Hispanic race variable was found to be highly correlated with most of all of the socioeconomic variables and even more so, the foreign-born variables. The foreign-born variables, such as the English language proficiency variable were also highly correlated with almost all of the occupation and education variables. For this reason, in models 1-3 where more

variables were included in the model, such as African American, Hispanic and Asian for racial variables, as well as income and occupation variables for socioeconomic variables, and foreign-born and citizenship variables for the foreign-born variables, the variables could only be looked at in a step-wise process and not as a whole. Basically this means that in model 1, race variables were looked at alone, in model 2 race and socioeconomic variables were looked at and, in model 3 race and foreign-born models were looked at. The model with all of these race, socioeconomic and foreign-born variables combined could not be analyzed due to the severe multicollinearity that was posed by a number of the different variables, such as the Hispanic race variable, the blue collared occupational variable, and the foreign-born variables. All these variables together in one model created erratic outcomes where there were unexpected and erroneous misleading signs of coefficients for some variables that were contrary to results of univariate tests. Such erratic outcomes of models can occur due to the adding of variables having a high degree of correlation between certain indicators of socioeconomic status (Menard 1995). According to Belsley, Kuh, and Welsch (1980), multicollinearity among variables can result in misleading or “degraded” coefficient estimates due to a variety of different linear dependencies among variables and it is best to specifically identify the variable that was best predicted by or measured by the others, and select those that could be omitted.

In order to target issues of multicollinearity and to look at race, socioeconomic and foreign-born variables together, the race variable had to be collapsed into one “non-white” category, the socioeconomic variable used the “income” variable as a

proxy and the foreign-born variable used “non-English language speaking” variable as a proxy. The results of the reduction of variable choice for the logistic regressions were done in models 4-7. Model 4 looks at race vs. socioeconomic variable, model 5 looks at socioeconomic vs. foreign-born, model 6 looks at race vs. foreign-born and model 7 looks at all three, race, socioeconomic and foreign-born.

The results of these models found that firstly, in model 1, racial variables are significant predictors of hazardous waste facility locations (Table 7-4, Model 1). As minority races increase, the probability that the tracts will be located near a TSDF also increases. For socioeconomic variables, it shows that being of a blue collar occupation serves as a significant predictor to a hazardous waste facility. (Table 7-4, Model 2). In the presence of the occupation variable, the income variable and unemployment variable were not statistically significant. Both foreign-born variables, tested, percent foreign-born and foreign-born non-citizens were statistically significant (Table 7-4, Model 3). As the percentages of foreign-born minorities and non-citizens increase, it is likely that the probability that a census tract is located near a TSDF increases. Although models 1-3 strive to create an environment free of multicollinearity as much as possible with the given dataset, with the number of similar category variables in one model, ie. socioeconomic variables, it can be likely that multicollinearity is not completely avoided. In order to target this, a reduced model of variables were combined in models 4-7, and namely to see if race, socioeconomic and foreign-born variables are combined, whether or not they will maintain their explanatory power to predict TSDF location. In model 4, it is evident that both race and income are statistically significant as the non-white percentage

are positive predictors of hazardous waste facility location, mean household income is a negative predictor of hazardous waste facility locations. Model 5 shows that in the absence of race, socioeconomic and foreign-born variables are both significant predictors of TSDFs. Race and foreign-born variables together without the socioeconomic variable (Table 7-4, Model 6), follows these same trends where both race and foreign-born variables are significant predictors of TSDFs. However in model 7, where all three categories of variables are combined, the socioeconomic variable does not maintain its explanatory power in the presence of both race and foreign-born variables together. In this full model (Table 7-4, Model 7), only the race and foreign-born variables remain significant in predicting the location of hazardous waste facilities in Los Angeles County. Race, therefore, as always is a significant predictor of these environmental hazards, however between the socioeconomic and non-assimilated foreign-born variables, the significance of the socioeconomic factor drops out when the non-assimilated foreign-born is included.

Table 7.4: Logistic Regression for 3-kilometer radius from TSDFs in Los Angeles County for Racial, Socioeconomic and Foreign-born Variables

	Model 1	Model 2	Model 3	
	N=2047			
	B	B	B	
Constant	-6.639 ***	.927	-4.705 ***	
RACIAL VARIABLES				
% African American	5.389 ***			
% Asian	5.540 ***			
% Hispanic	6.131 ***			
SOCIOECONOMIC VARIABLES				
Median Household Income		-1.005		
% Persons Unemployed		1.007		
% Blue Collared Occupations		5.743 ***		
FOREIGN BORN VARIABLES				
% Foreign Born			1.356 ***	
% Not a US Citizen of the Foreign Born Population			3.664 ***	
	Model 4	Model 5	Model 6	Model 7
	N=2041	N=2041	N=2041	N=2041
	B	B	B	B
Constant	4.384 *	4.567	-4.508 ***	-4.420
RACIAL VARIABLE				
% Nonwhites of single race, excluding some white Hispanics	3.530 ***		3.469 ***	3.446 ***
SOCIOECONOMIC VARIABLE				
Median Household Income	-1.746 ***	-1.570 **		-0.017
FOREIGN BORN VARIABLE				
% Persons that Speak English Not Well or Not at All		4.466 ***	3.721 ***	3.752 ***

7-3 Conclusion

The results of this study has shown that there are strong racial, socioeconomic and foreign-born related disparities in the present day location of hazardous waste facilities for the year 2000 in Los Angeles County. The host neighborhoods surrounding the facilities were found to have significantly higher percentages of minorities, however not all the minority subgroups were affected the same way. The Hispanics were the most disproportionately located near the TSDFs followed by the African Americans. Asians did not show to appear to be disproportionately located near these facilities and in terms of the descriptive statistics showed a trajectory similar to the non-Hispanic White population. With support from the previous chapter, which created a typology of races based on foreign-born characteristics, it was predicted that the Hispanics would have the worst outcomes given that they are marked by both low-socioeconomic and high foreign-born characteristics. On top of this, not only are they largely foreign-born minorities, they are foreign-born groups that exhibit mainly unassimilated foreign-born characteristics (i.e. high levels of non-English speaking populations and non citizens). This is in comparison to the Asian population, which were of high foreign-born characteristics as well, but upon deeper examination, in Los Angeles County, the Asian population were found to be more assimilated foreign-born with a higher percentage of English speakers and a higher percentage of naturalized citizens. The African Americans were identified as low socioeconomic characteristics but low foreign-born. It was questioned whether or not African Americans would be as marginalized given the fact that they hold little

foreign-born traits. The answer to this question in large part is that in comparison to the Hispanic population, they are not. However in comparison to the Asian population they are. This leads us to believe that being of low socioeconomic status lends a stronger predictor of environmental disamenity than being a minority that is of higher socioeconomic outcomes. Upon an interaction analysis, the results showed that the combination of being either Hispanic or African American and high socioeconomic status was associated with an exceptionally high likelihood of being located in a TSDF neighborhood in comparison to being white and having high socioeconomic status which results in exceptionally low likelihoods of living proximate to a TSDF. Although Asians exhibited similar results in comparison to the Whites, in comparison to the other minority races, Asians were not as negatively impacted. This interaction suggests that high socioeconomic status, while they may help Whites avoid being proximate to environmental hazards, the same is not true for Hispanics or African Americans. Therefore, high socioeconomic status does not afford the same degree of immunity against living in a host neighborhood for Hispanics and African Americans. For both Hispanics and African Americans, having low socioeconomic status was found to result in a relatively high likelihood of living near a TSDF and even Hispanics and African Americans of high socioeconomic status were also more highly concentrated in host neighborhoods than whites of high socioeconomic status. This points to the conclusion that regardless of socioeconomic status, Hispanics and African Americans in Los Angeles County are more likely to live near a hazardous waste facility. Asians are much less likely than both Hispanics and African Americans, but they are more prone to them than whites.

The statistical analysis in this chapter identifies that hazardous waste facilities tend to be located near minority populations that exhibit high non-assimilated foreign-born characteristics. Race remains a strong predictor in the location of these facilities. However, in a full model of race, income and a non-assimilated foreign-born variable, income loses its explanatory power as a predictor of the location of TSDFs. This can lead to a conclusion that being a minority with non-assimilated foreign-born characteristics can be more of a disadvantage than being a minority with low income. Along these lines, it was found that in Los Angeles County, the Hispanic population was the most disproportionately impacted racial group even more than the African Americans.

The next chapter will explore the longitudinal analysis of race, socioeconomic and foreign-born variables surrounding TSDFs from 1970-2000. It will also look into the hazardous waste facility sitings at a deeper level and examine whether TSDF siting in Los Angeles County was a result of disproportionate siting or post-siting demographic change.

CHAPTER EIGHT: **LONGITUDINAL ASSESSMENT OF RACIAL, SOCIOECONOMIC AND FOREIGN- BORN CHARACTERISTICS SURROUNDING TSDFS FROM 1970-2000**

The previous chapter presented results from cross-sectional assessments of racial, socioeconomic and foreign-born characteristics of residents living in close proximity of hazardous waste facilities in 2000. The results show that hazardous waste facilities tend to be located not only near impoverished and minority neighborhoods, but those that are marked by a high degree of foreign-born concentration. The results are consistent with recent environmental justice studies of locations of hazardous waste facilities and the disproportionate impacts that currently exist for people of color and immigrants. From the demographics of one single census we cannot explain these disproportionate burdens. In other words, in Los Angeles County, are these outcomes due to discriminatory siting which involves the voluntary siting of hazardous waste facilities in communities of color, low socioeconomic status populations or immigrant communities? Or could they be the result of “minority move-in” where underprivileged populations voluntarily move in to the communities surrounding these environmental hazards, simply because they find these areas more favorable to their own needs, as these areas may often be much cheaper places to live our clusters of ethnic enclaves which may suit certain cultural needs of certain people such as immigrant groups. Also, as a whole this chapter will examine the demographic shifts from the 1970 to 2000 census to see what types

of prominent changes occur around these communities hazardous waste facilities. Are there changes in the demographic characteristics that surround the hazardous waste facilities over time? If so what are those characteristics? By comparing the censuses of different decades from 1970-2000 surrounding the TSDFs we will be able to better examine and answer these questions.

8-1 Data and Methods

For this study, the US Decennial Census Data for each decade from 1970 to 2000 were used to analyze tracts in Los Angeles County surrounding the locations of TSDFs. In order to accurately consider whether racial, socioeconomic and foreign-born characteristic disparities exist surrounding hazardous waste facilities, circular host neighborhood areas of 1, 3 and 5-kilometer radii surrounding the hazardous waste facilities were drawn. These circular buffers of varying radii constitute the host neighborhoods and non-host areas are areas beyond the 1, 3 and 5 kilometer radii from the facility. The areal apportionment method was used to analyze the demographic data surrounding the facilities. These methods were repeated for each successive decade from 1970 to 2000. Once again, a detailed explanation of the areal apportionment method is offered in Chapter 5, the methods chapter of this dissertation and remains as the consistent method for determining the demographic characteristics surrounding specific kilometer mile buffers circling any given hazardous waste facility.

Census data variables for race, below poverty, income, and education along with foreign-born status, language spoken and non-English speaking variables were

examined. Through these methods, interactions were assessed by examining differences in the relative likelihood of living in a TSDF host neighborhood between non-minorities and minorities by subgroup of low socioeconomic status versus those of high socioeconomic status. The raw numbers for each of the race, socioeconomic and foreign-born variables were extracted and used to calculate what percentage of the total variable was included in the 3-kilometer radius surrounding a facility. Percentages were calculated by dividing the raw numbers of the interested variables contained in the tracts within a 3-kilometer radius of the facility by the number of people in the total 2057 tracts in Los Angeles County and multiplying this by 100. These calculations gave rise to percentages that would allow one to compare between the different variables to see how the demographic composition of the 3-kilometer circular buffers surrounding a hazardous waste facility compares with each other. Each of these census variables was calculated for each decade for 1970-2000 so that they could be compared across decades.

In order to research answers to questions on what came first, the people or the pollution, this study uses the same methods as described above but divided by when the facilities were first sited in the location. For this method, specific decades were divided up to include into three separate categories: 1) 1965-1975, 2) 1976-1985; and 3) 1986-1995. TSDFs that were sited within these categories were analyzed and broken up amongst these three groups. The areal apportionment method explained above was used to construct the demographic data surrounding the 3 kilometers of the respective facilities. These three TSDF siting categories were created so that we could better compare the actual demographics at the time of

facility siting as well as examining any of the demographic changes that occur after that decade of siting. They were purposely created to accommodate to the current census data, which is compiled every decade (1970, 1980, 1990, etc.) as the facility siting categories were broken up by 10-year intervals surrounding these decennial censuses. For instance if the range for the facility siting categories were set at 1960-1970, it would be hard to select which particular year of the census would be the right decade to examine to account for the present-day demographics at the actual time of siting. For instance, facilities sited in the early 1960s like 1962, for example, would be closer to the present-day demographics of the 1960 census while those sited in the late 1960s, like 1969, would be closer to the present-day demographics of the 1970 census. To account for this potential problem, the facilities were broken up so that one decade's census data could explain the demographic conditions at the time of siting for certain facilities sited within a specific period. Going back to the above example of the facility-siting category, 1965-1975, we are able to look to the 1970 census data to give us the closest present-day demographic data at the time of siting for all the facilities sited between 1965-1975.

We are unfortunately limited by the fact that some of the variables, (the immigrant variables or income/education variables separated by race) are not available for all decades as the census does not start accounting for these variables until the more recent variables. For this reason our longitudinal study will largely cover four decades from 1970-2000, however the 1970 census can only be looked at for the racial and some socioeconomic variables as the 1970s census did not have any immigrant variables or other socioeconomic variables separated by race.

When we are measuring present day disparities three main facility siting categories: 1966-1975, 1976-1985 and 1986-1995 will be used. The 1966-1975 facility siting category will look at the 1970 census to examine the present-day demographics at the time of siting, 1976-1985 facility siting category will examine the present-day demographics by using the 1980 census data and the 1986-1995 facility siting category will look at the 1990 census data for present-day demographic information.

8-2 Results and Analysis

In this chapter, a longitudinal analysis of demographic variables surrounding the hazardous waste facilities was done for four decades from 1970-2000. Table 8-1 shows the descriptive statistics of a 3-kilometer radius surrounding each of the 17 hazardous waste facilities and Table 8-2 shows the general demographics of Los Angeles County as whole during these respective decades. In comparing the two tables at each decade we are able to see the relative difference in population surrounding the facilities. In these two tables we are looking at the general trend of the demographics for both the regions surrounding the hazardous waste facility as well as in Los Angeles County as a whole. For the racial variables, in 1970 the White population was the highest as a whole at 85.65% compared to 76.63% for regions surrounding the hazardous waste facilities, followed by Hispanics at 18.4% compared to 30.5% for regions surrounding the facilities and then the Black population at 10.85% compared to 19.68% surrounding the facilities. In 1970 there was no separate Asian race category so we were not able to determine how many Asians existed in Los Angeles County at this time. The foreign-born population, in

1970 was 11.3% while the area surrounding the TSDFs was at 13.0%. Looking at some of the socioeconomic variables, we can see that in 1970 the below poverty rate was at 10.7% compared to 15.5% proximate to the facilities, people without a high school degree was 38.0% compared to 50.4% surrounding the facilities and blue collar jobs are at 31.6% compared to 17.4% near the facilities. Aside from the occupational variable outcomes, which show results that are opposite to what we would expect, for the most part it is evident that we can conclude upon certain trends in the analysis. As a whole the host tracts surrounding the facilities are higher in racial minorities and populations of low socioeconomic status and foreign-born than the others. These four decades of data offer some interesting outcomes in the changing demographics of Los Angeles County overall as well as the demographic changes surrounding hazardous waste facilities. First and foremost it is evident that both in the county as a whole as well as the host neighborhoods surrounding a facility, the non-Hispanic White population has been consistently declining. From 1970 to 1980, there is a pretty dramatic drop in the number of whites in all tracts in Los Angeles County from 85.69% to 53.28%. Tracts surrounding 3 kilometers of the hazardous waste facilities show an even more dramatic decline from 76.63% to 25.23%. These results are indicative of the fact that regardless of the population decline in the White population as a whole, there is still a dramatic decline in the number of non-Hispanic Whites surrounding the hazardous waste facilities. On the flip side of this, there is a large increase in the Hispanic population both overall and also more dramatically surrounding the hazardous waste facilities. In the 1970s only 18.4% were Hispanic in Los Angeles County, followed by an increase every decade

after from 1980-2000. These numbers go from 18.4% to 37.30% and then to 44.58%. By 2000, almost 45% of the population in Los Angeles County is Hispanic. Surrounding the facilities there is a larger increase in the Hispanic population to almost 67% in 2000. The area surrounding the facilities has roughly 50% more Hispanics surrounding the facilities in relation to the rest of the population in Los Angeles County. The African American population shows the opposite trend. In Los Angeles County, there is little change and in fact a slight decrease in the African American population as a whole by 2000. In 1970 10.85% of the population was African American and though there was a slight increase in 1980 to 12.61%, from that point there has been a decrease of 1-2 percent to 11.17% and 9.63%. Consistent to the results for the Hispanics, the percentages of the Black population surrounding the facilities were elevated. However 1970 and 1980 show to be the decades with the highest number of the Black population at 19.68% and 21.56%. In 2000, 13.18% of the population surrounding a TSDF was black. And though this is higher than the 9.63% which marks the Black population as a whole in Los Angeles County, the degree of disproportionate numbers surrounding TSDFs for the Black population was much greater during the 1970s and 1980s in relation to that of the 1990s and 2000s.

While these tables offer some interesting general results, before any major conclusions are reached by these numbers, I would like to emphasize the fact that the outcomes shown in these tables can really only use these figures as a point of reference to view the change across the four decades for each of the variables. The main reason for this has to do with the fact that the 17 facilities that are accounted

for and analyzed all exist by the 2000 census, but we cannot conclude that the same is true for the earlier decades. In other words, we cannot conclude that a TSDF that existed in 2000 existed in 1970 as well. Therefore, some of the demographics in the earlier decades give us insights to the population inhabiting a region that will eventually house a TSDF if it hadn't already by 1970. The data shown in tables 8-1 and 8-2 provide a good analysis of the demographics that lead up to the 2000 census where 17 TSDFS exist. As stated earlier we can follow the same variables across the different decades starting from 1970 through 2000, in Los Angeles County, we can see that there is a decline in the number of certain races and an increase in others. There is a consistent decline of the non-Hispanic white population, a slight decrease to a relatively stagnant pattern of Blacks and a huge increase in the Hispanic population through the increasing decades from 1970-2000 in all of Los Angeles County.

In order to truly analyze the effects of disproportionate siting vs. post siting demographic change, in the next section, the facilities were divided up according to when they were actually sited. The demographics surrounding a 3-kilometer radius surrounding the facilities at the time of siting was analyzed.

Table 8-1 Los Angeles Descriptives of Tracts Surrounding 3km of TSDf for Years 1970-2000

	3km Circle for 1970	3km Circle for 1980	3km Circle for 1990	3km Circle for 2000
Total Population	919,296	979,815	1,170,400	1,227,601
Population Density	6,768	7,214	8,617	9,038
RACIAL VARIABLES				
% White alone	76.63%	25.23%	14.60%	9.14%
% Black alone	19.68%	21.56%	16.75%	13.18%
% Asian/Pacific Islander alone	n/a	5.50%	9.41%	9.27%
% Hispanic	30.5%	47.55%	59.83%	66.84%
% Mexican Origin	47.9%	86.78%	85.17%	79.30%
SOCIOECONOMIC VARIABLES				
Mean Household Income	\$8,881	\$16,616	\$33,698	\$44,953
% Persons below Poverty Level	15.5%	20.18%	21.95%	24.97%
% NH White Below Poverty	9.3%	15.01%	17.99%	12.75%
% Black Below Poverty	5.7%	27.12%	26.26%	28.69%
% Asian/Pacific Islander Below Poverty	n/a	13.60%	16.02%	16.71%
% Hispanic Below Poverty	16.4%	23.01%	24.75%	27.18%
% Employed in Management, Professional, and Related Occs	41.4%	42.33%	40.66%	21.45%
% Employed in Production, Transport, and Material Moving Occs	17.4%	16.88%	19.08%	26.29%
% Persons w/o HS Degree	50.4%	45.78%	48.20%	48.30%
% Persons w/ 4 Yr College Degree	6.9%	9.72%	11.14%	12.10%
% NHW with 4 Yr College Deg/Higher	n/a	10.64%	12.75%	28.31%
% Black with 4 Yr College Deg/Higher	n/a	7.30%	9.67%	12.83%
% API with 4 Yr College Deg/Higher	n/a	31.70%	29.72%	31.12%
% Hispanic with 4 Yr College Deg/Higher	n/a	3.80%	3.52%	4.32%
FOREIGN-BORN VARIABLES				
% Foreign-born	13.0%	29.06%	40.90%	42.63%
% Persons 5+ that Speak Spanish and Speak English Not Well or Not at all	n/a	13.12%	17.38%	18.76%
% Persons 5+ that Speak Asian/Other Language and Speak English Not Well or Not at all	n/a	1.24%	2.05%	2.71%
% Persons 5+ that Speak English Not Well or Not at all	n/a	14.36%	19.43%	21.48%
% Not a US Citizen of Foreign Population	n/a	n/a	n/a	68.53%
% Not a US Citizen of the Total Population	n/a	n/a	n/a	29.22%

Table 8-2 Descriptive Demographics of All Tracts in Los Angeles County from 1970-2000

	All 1970 Tracts	All 1980 Tracts	All 1990 Tracts	All 2000 Tracts
Total Population	7,016,409	7,473,005	8,862,508	9,519,338
Population Density	1,728	1,840	2,182	2,344
RACIAL VARIABLES				
% White alone	85.69%	53.28%	41.01%	30.95%
% black alone	10.85%	12.61%	11.17%	9.63%
% Asian/Pacific Islander alone	n/a	6.11%	10.78%	12.20%
% Hispanic	18.4%	27.63%	37.30%	44.58%
% Mexican Origin	39.5%	79.56%	76.21%	71.72%
SOCIOECONOMIC VARIABLES				
Mean Household Income	\$11,173	\$22,070	\$47,252	\$61,811
% Persons below Poverty Level	10.7%	13.42%	15.07%	17.91%
% NH White Below Poverty	7.8%	9.87%	10.60%	8.52%
% Black Below Poverty	2.6%	22.89%	21.18%	24.38%
% Asian/PI Below Poverty	n/a	12.90%	13.21%	13.94%
% Hispanic Below Poverty	14.5%	20.53%	22.90%	24.19%
% Employed in Management, Professional, and Related Occs	26.2%	27.72%	30.95%	34.33%
% Employed in Prod, Transport, and Material Moving Occs	31.6%	29.24%	27.84%	20.53%
% Persons w/o HS Degree	38.0%	30.16%	29.97%	30.10%
% Persons w/ 4 Yr College Dg	12.7%	18.48%	22.32%	24.86%
% NHW with 4 Yr College Dg+	n/a	20.60%	25.63%	37.71%
% Black with 4 Yr College Dg+	n/a	11.04%	14.81%	17.84%
% API with 4 Yr College Degree+	n/a	34.91%	37.20%	42.38%
% Hispanic with 4 Yr College Dg+	n/a	5.73%	6.05%	6.79%
FOREIGN-BORN VARIABLES				
% Foreign-born	11.3%	22.27%	32.66%	36.24%
% Persons 5+ that Speak Spanish and Speak English Not Well or Not at all	n/a	6.68%	9.93%	11.04%
% Persons 5+ that Speak Asian/Other Language and Speak English Not Well or Not at all	n/a	1.56%	2.15%	3.24%
% Persons 5+ that Speak English Not Well or Not at all	n/a	8.24%	12.08%	14.29%
% Not a US Citizen of Foreign Population	n/a	n/a	n/a	61.97%
% Not a US Citizen of the Total Population	n/a	n/a	n/a	22.46%

8-2-1 Longitudinal Analysis: Discriminatory Siting or Post-Siting Demographic Change?

Although we have limited census data for older decades, this study was able to analyze into more greater detail what types of demographics surrounding the regions the hazardous waste facilities were sited at the time of siting as well as the demographic change that occurred in these areas after the point of siting. To really look deeper into this, the 17 facilities in Los Angeles County were divided up by date of siting into three major groups: 1) Facilities sited between 1966-1975; 2) Facilities sited between 1976-1985; and 3) Facilities sited between 1986-1995. The facilities sited in Group 1 (1966-1975) looked to the 1970 census data as the “present day” demographic data for when the facilities were sited and the subsequent decades 1980-2000 are the decades that show the post-siting demographic change. For the facilities sited in Group 2 (1976-1985), the 1980 census data was used to analyze the “present day” demographics for when the facilities were sited. The 1990-2000 census was used to show the post siting demographic change for facilities sited in Group 2. For Group 3 (1986-1995), the 1990 census was used to show the “present day” demographics at the time of siting. The 2000 census showed one decade of post-siting demographic change for the group 3 facilities.

Starting with the group 1 facilities, we can see that the most impacted racial group are the African Americans at the time of siting between 1965-1975. Unfortunately the 1970 census does not offer any of the immigrant variables and for this reason we are only able to analyze the racial and some socioeconomic variables. In general we can see that at the time of siting the TSFDs in 1965-1975, there were certain socioeconomic variables such as people below poverty, blue collared occupations or persons without a high school degree that are much higher within a 3 kilometer radius of

the TSDFs versus that beyond the 3 kilometer radius. However the most prominent characteristic of the present day demographics of facility siting in this decade has to do with the abnormally high African American population that surrounded these facilities versus the area beyond the 3-kilometer radius of the facility. The 46.47% versus 9.97% is the difference we can observe here for the black population within a 3-kilometer radius of the facility versus beyond the 3-kilometer radius of the facility. In Figure 8-1 we can see in graph from of the stark change and comparison between the population within 3 kilometers of the TSDF versus beyond the 3 kilometer radius of the facility. In analyzing these graphs we would see two parallel lines increasing or decreasing at the same rate if there was no affect of the waste facility in these tracts. Any change in the slope of the two lines for population change across decades would indicate that there is an affect on the tracts within versus the tracts beyond the hazardous waste facilities.

In Figure 8.1, however, we can see here that for the African American population, they face disproportionate burdens in all decades as the demographics within 3 kilometers of the facility show an elevated number of African Americans than beyond the 3 kilometers. From the slopes of these two lines, we can see that in 1970 there is a high degree of African Americans surrounding 3 kilometers of the waste facility. As a matter of fact, when analyzing the facilities that were sited in this period we can definitely see evidence of discriminatory siting where facilities were sited in neighborhoods with an increased black population. The within 3 kilometer versus the beyond 3 kilometer difference is quite drastic in all decades, however for the Black population, In 1970, which are the demographics at the time of siting for facilities sited in 1965-1975, it is clear that there is a disproportionately large percent of African

Americans surrounding the facilities. The post-siting demographic change for the Black population reflects a general decline in the number of Blacks in the overall population as a whole, as well as a decline in the population surrounding the facilities as well for the subsequent decades. In Figure 8-1 we can see the within 3 kilometer and beyond 3 kilometer lines being to converge starting in 1980 and more and more in the subsequent decades. In Figure 8-2 for the Hispanic population, the opposite phenomenon was observed. The Hispanics at the time of siting in 1970, were not disproportionately burdened by the siting of the hazardous waste facilities.

In Figure 8-2 we can observe how at the time of siting there were less Hispanics surrounding the facility than beyond the facility, thereby reflecting that there was not discriminatory siting with respect to the Hispanic population for facilities sited between 1966-1975. As a whole, the Hispanic population shows a steep increase in population both overall as well as surrounding the waste facility. However in 1980, the within 3 kilometer and beyond 3 kilometer lines intersect and then for the subsequent decades the demographics shift whereby there is a higher number of Hispanics in tracts surrounding the facility than not. This is reflective of post-siting demographic change, not discriminatory siting for the Hispanic population with respect to the facilities sited between 1966-1975. Unfortunately, no census data existed for the Asian population in the 1970s, so no meaningful analysis could be done on this subgroup for this decade. The results of the non-Hispanic White population is as expected. At the time of siting in 1970, the White populations so no effect of the incoming hazardous waste facilities and there is no sign of any post-siting demographic change in the regions surrounding the facilities. Instead, for the white population there is just a general population decline in

the county as a whole. This declining trend for the non-Hispanic White population is consistent both within the 3 kilometers of the hazardous waste facilities and beyond the 3 kilometers of the waste facility showing no effect by the TSDF location. The foreign-born population also was not affected by the siting of the TSDF between 1966-1975. As a matter of fact, in 1970 there were more foreign-born populations living outside the 3-kilometer circle of the TSDF than within. By 1990 and 2000, there was an increase in the number of foreign-born populations near the facility, however it did not indicate signs of post demographic change in these areas that would indicate that the foreign-born population moved into this areas after facility siting. Looking not just at the foreign-born variable, but examining further into other variables such as the non-English speaking variable in Table 8-3, it is apparent that although no big effect is seen for just the foreign-born as a whole, higher percentages of non-English speaking populations, and namely Spanish speaking populations were located in areas proximate to the facilities. The degree of these disproportionate numbers increased in latter years from 1990-2000. Examining the 1966-1975 facilities, we can see how discriminatory siting did occur to some level on part of the Black population.

The results of this study show clear and pronounced outcomes of disproportionately large Black populations surrounding the TSDFs that were sited in Los Angeles County during these years. However we can also observe that there was a decline in the percentages of Blacks in the subsequent decades following these facility sitings. It was also found that the locations proximate to the hazardous waste facilities showed post-siting demographic changes in overall racial compensation. As there was an out flow of the Black population, there was a large influx of the Hispanic population. Moreover, in

addition to this, populations marked by foreign-born characteristics such as the non-English speaking populations, and namely the Spanish speaking populations were more pronounced in close proximity to the hazardous waste facilities.

Figure 8-1 1970-2000 Black Population Surrounding a Hazardous Waste Facility Sited between 1966-1975

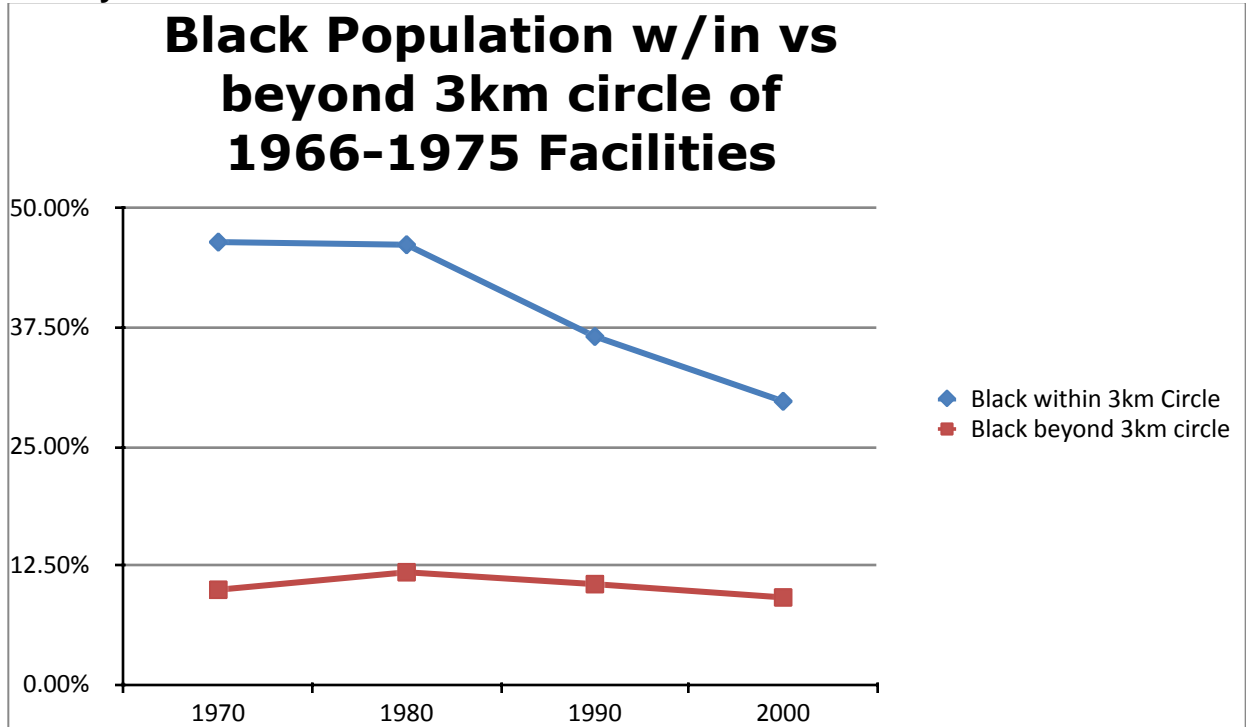


Figure 8-2 1970-2000 Hispanic Population Surrounding a Hazardous Waste Facility Sited between 1966-1975

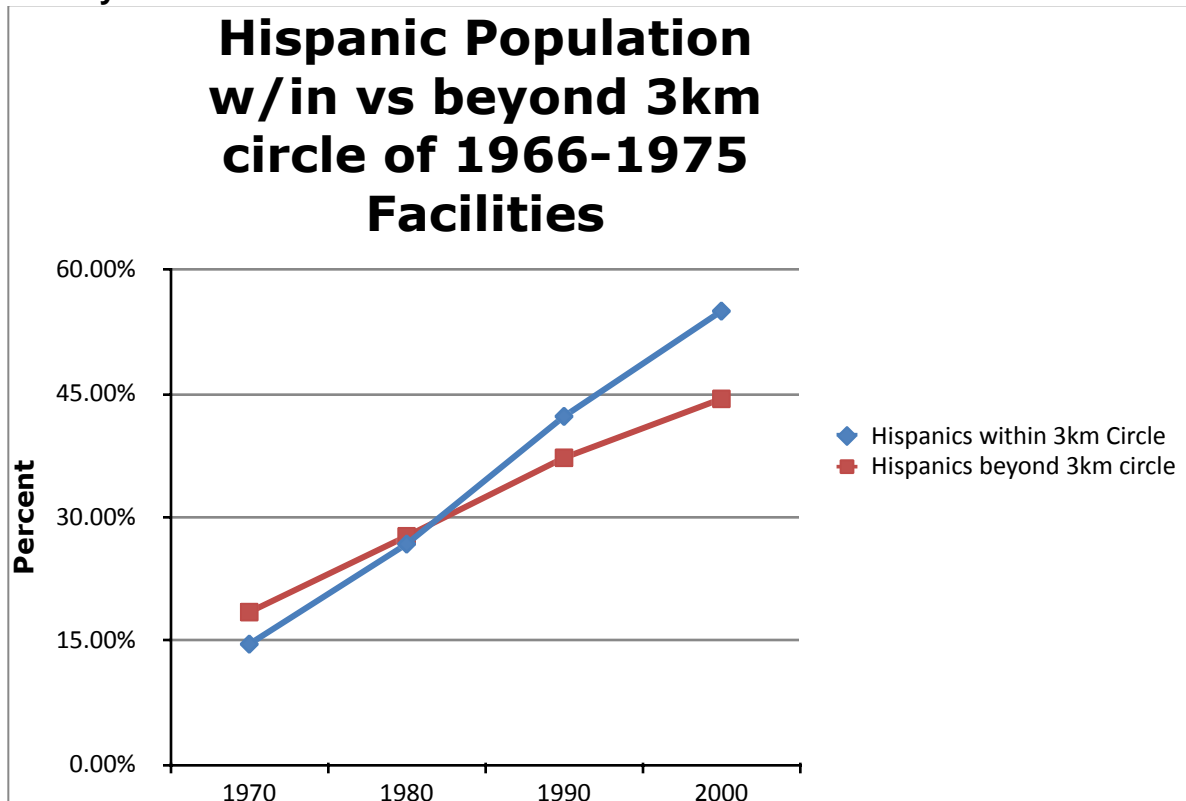


Figure 8-3 1970-2000 Non-Hispanic White Population Surrounding a Hazardous Waste Facility Sited between 1966-1975

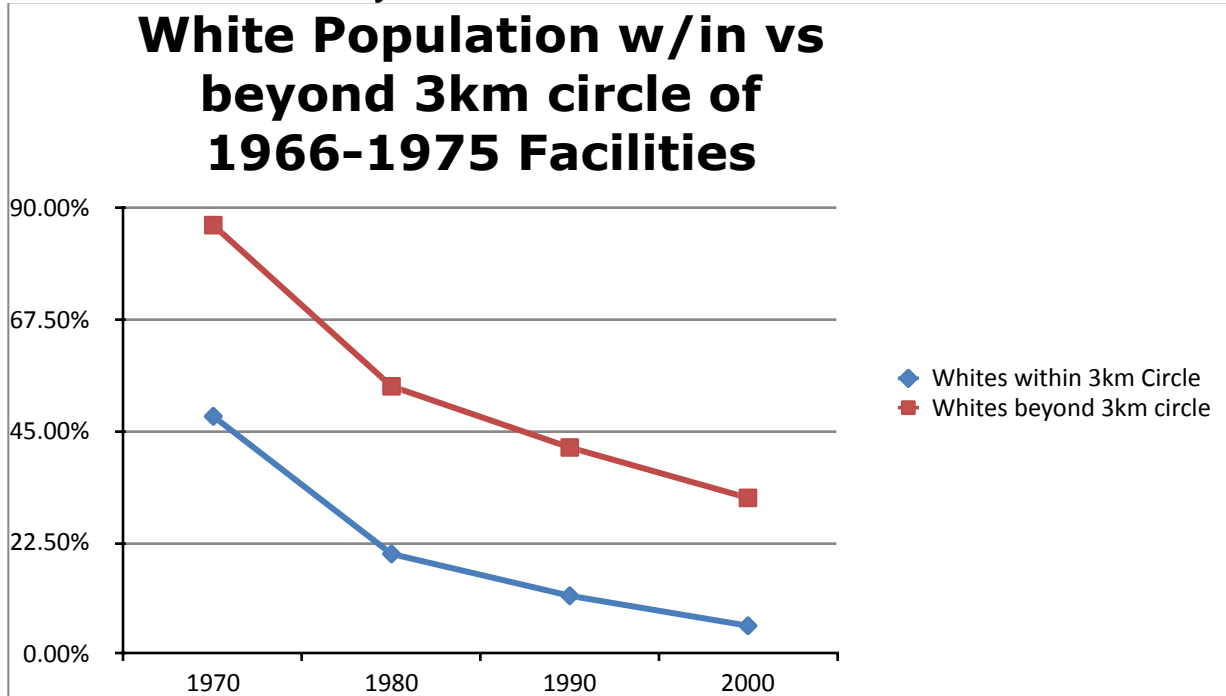


Figure 8-4 1970-2000 Foreign-born Population Surrounding a Hazardous Waste Facility Sited between 1966-1975

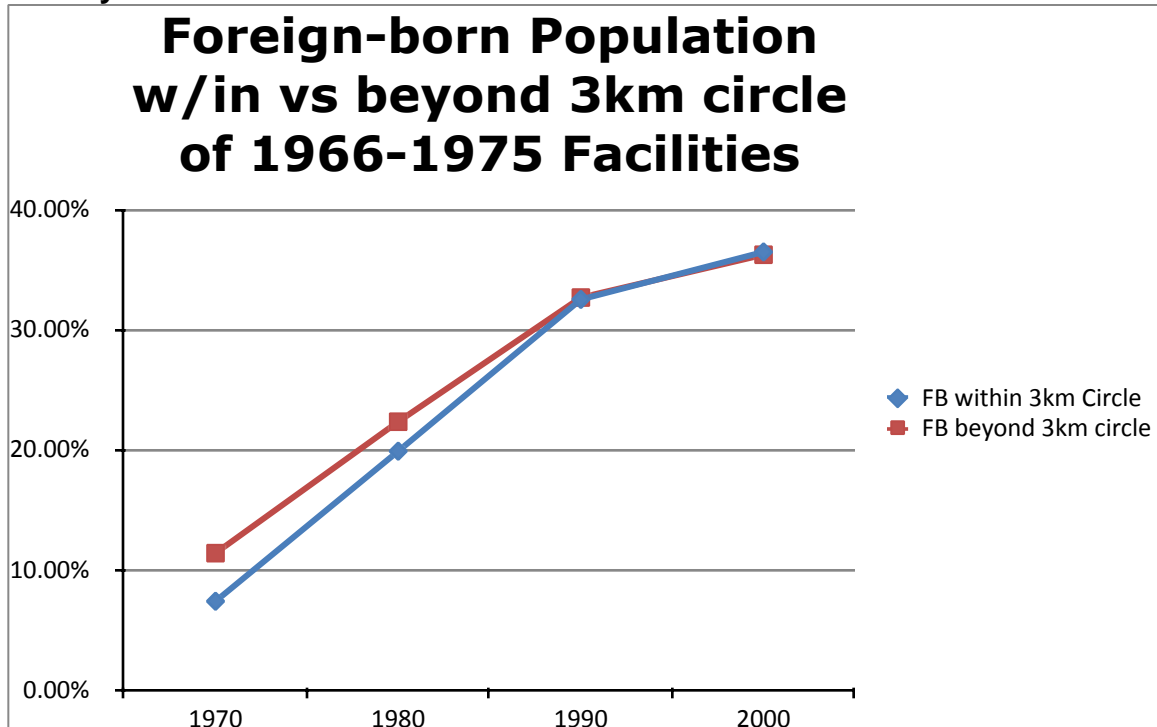


Table 8-3 Demographics of Tracts Surrounding 3km Radius of Facilities Sited Between 1966-1975 in Los Angeles County from 1970-2000 Census

	3km Circle for 1970	Beyond 3km 1970	3km Circle for 1980	Beyond 3km 1980	3km Circle for 1990	Beyond 3km 1990	3km Circle for 2000	Beyond 3km 2000
Total Population	170,881	6,845,528	176,333	7,296,672	211,911	8,650,597	219,045	9,300,293
Population Density	6,644	1,696	6,856	1,808	8,239	2,144	8,517	2,305
RACIAL VARIABLES								
% White alone	48.01%	86.63%	20.22%	54.08%	11.77%	41.73%	5.72%	31.54%
% black alone	46.47%	9.97%	46.19%	11.80%	36.56%	10.55%	29.75%	9.16%
% Asian/Pacific Islander alone	n/a	n/a	7.18%	6.08%	10.33%	10.79%	7.24%	12.32%
% Hispanic	14.6%	18.5%	26.71%	27.66%	42.20%	37.18%	54.98%	44.33%
% Mexican Origin	36.7%	39.6%	87.34%	79.37%	86.64%	75.92%	78.33%	71.52%
SOCIOECONOMIC VARIABLES								
Mean Household Income	\$ 7,602	\$ 11,262	\$ 14,806	\$ 22,232	\$ 28,679	\$ 47,636	\$ 37,868	\$ 62,288
% Persons below Poverty Level	19.4%	10.5%	24.21%	13.16%	26.61%	14.79%	31.97%	17.58%
% NH White Below Poverty	7.6%	7.8%	19.10%	9.77%	22.57%	10.47%	25.90%	8.44%
% Black Below Poverty	10.9%	2.3%	24.80%	22.71%	27.24%	20.66%	32.13%	23.77%
% Asian/Pacific Islander Below Poverty			15.74%	12.82%	18.47%	13.09%	22.16%	13.81%
% Hispanic Below Poverty	18.4%	14.4%	28.04%	20.35%	31.13%	20.36%	34.14%	21.55%
% Employed in Management, Professional, and Related Occupations	13.7%	26.5%	14.67%	27.96%	16.97%	31.20%	17.67%	34.62%
% Employed in Production, Transportation, & Material Moving Occupations	47.9%	31.3%	45.38%	28.94%	43.37%	27.56%	32.48%	20.32%
% Persons 25 yrs & over w/o HS Degree	51.2%	37.7%	43.83%	29.87%	45.51%	29.65%	48.99%	29.72%
% Persons 25 yrs & over w/ 4 Yr College Degree	5.0%	12.9%	7.76%	18.71%	8.89%	22.60%	8.22%	25.19%
% NHW Persons 25+ with 4 Yr College Degree or Higher	n/a	n/a	7.77%	20.74%	9.94%	25.78%	18.26%	37.79%
% Black Persons 25+ with 4 Yr College Degree or Higher	n/a	n/a	6.37%	11.44%	8.01%	15.35%	9.41%	18.44%
% API Persons 25+ with 4 Yr College Degree or Higher	n/a	n/a	24.53%	35.19%	21.40%	37.53%	19.97%	42.71%
% Hispanic Persons 25+ with 4 Yr College Degree or Higher	n/a	n/a	3.56%	5.78%	2.78%	6.13%	2.86%	6.89%
FOREIGN-BORN VARIABLES								
% Foreign born	7.4%	11.4%	19.88%	22.33%	32.51%	32.67%	36.46%	36.23%
% Persons 5+ that Speak Spanish and Speak English Not Well or Not at all	n/a	n/a	8.39%	6.63%	12.87%	9.86%	16.98%	10.90%
% Persons 5+ that Speak Asian/Other Language and Speak English Not Well or Not at all	n/a	n/a	1.11%	1.58%	1.70%	2.16%	1.54%	3.28%
% Persons 5+ that Speak English Not Well or Not at all	n/a	n/a	9.50%	8.21%	14.57%	12.02%	18.51%	14.19%
% Not a US Citizen of the Foreign Population	n/a	n/a	n/a	n/a	n/a	n/a	73.39%	61.70%
% Not a US Citizen of the Total	n/a	n/a	n/a	n/a	n/a	n/a	26.76%	22.35%

The Group 2 facilities are the hazardous waste facilities that were sited between 1976 and 1985. For these facilities the 1980 census data show the demographic conditions at the time of facility siting. Based on the results for this period, it could be concluded that the Black population was no longer the subject of discriminatory siting on part of the waste facilities sited in 1976-1985. As a matter of fact, results show a lower number of Blacks living proximate to the facilities sited in 1976 to 1985 and show a decline in the Black percentages that lived proximate to the group 2 facilities for the subsequent decades from 1990-2000. On the other hand, for facilities sited from 1976-1985, the results showed both the Asian and Hispanic populations to be high within 3 kilometers of the TSDFs than beyond. The Asian population showed slight disparities at the time of siting in the within and beyond 3 kilometer population. The Hispanic population was most deeply impacted by disparate siting at the time for facilities sited between 1976-1985. There is a high percentage of Hispanics in close proximity to the hazardous waste facilities at the time of siting in 1980 and this outcome maintains for the subsequent decades that follow from 1990-2000. Looking at the slope of the two lines, it is clear that the slopes stay quite similar throughout the decades and there is not much post-siting demographic change with respect to the Hispanic population and these facilities. The same is true for the foreign-born population and the non-English speaking population surrounding the hazardous waste facilities sited. It is apparent that at the time of siting during 1976-1985, facilities were located in areas that were high in Hispanics, with high percentages of foreign-born, as well as high non-English speaking populations. Interestingly the African American population was no longer

detrimentally impacted by facilities sited between 1976-1985. Instead of the African American population, the Hispanic and non-assimilated immigrants were targeted. Also, as expected the non-Hispanic white population are consistently unaffected by these environmental hazards. The non-Hispanic White population is much higher beyond the 3 kilometers of the TSDF and this is true at the time of siting and remains consistent throughout the decades following.

Looking at the highlighted region in Table 8-4, it is apparent that the demographics of the region in close proximity to hazardous waste facilities sited during 1976-1985, is very Hispanic, overwhelmingly Mexican, with low percents of other minorities such as Blacks or Asians, depressed socioeconomically---high in populations below poverty, with blue collared jobs and no high school degree, high in foreign-born populations and high in non-assimilated immigrant characteristics—non English speaking. Interestingly in looking at the universe of below poverty population broken down further by subgroups, its interesting to find that there are many more low income Blacks and non Hispanic whites that are below poverty proximate to the hazardous waste facilities than that which are Hispanic. For instance, within 3 kilometers of the hazardous waste facilities sited between 1986-1985, only 9.88% are Black (which is lower than the 12.8% Black composition of the region beyond the 3 kilometer radius of facility), as opposed to some 57.73% Hispanic. However in looking at the specific below poverty breakdowns, some 30.24% are Blacks below poverty in relation to the 24.36% Hispanics below poverty. This can lend to the possibility that surrounding a hazardous waste facility, there are higher percentages of people that are of depressed economic status, especially

minorities, in addition to populations with non-assimilated immigrant traits regardless of depressed economic status.

Figure 8-5 1970-2000 Black Population Surrounding a Hazardous Waste Facility Sited between 1976-1985

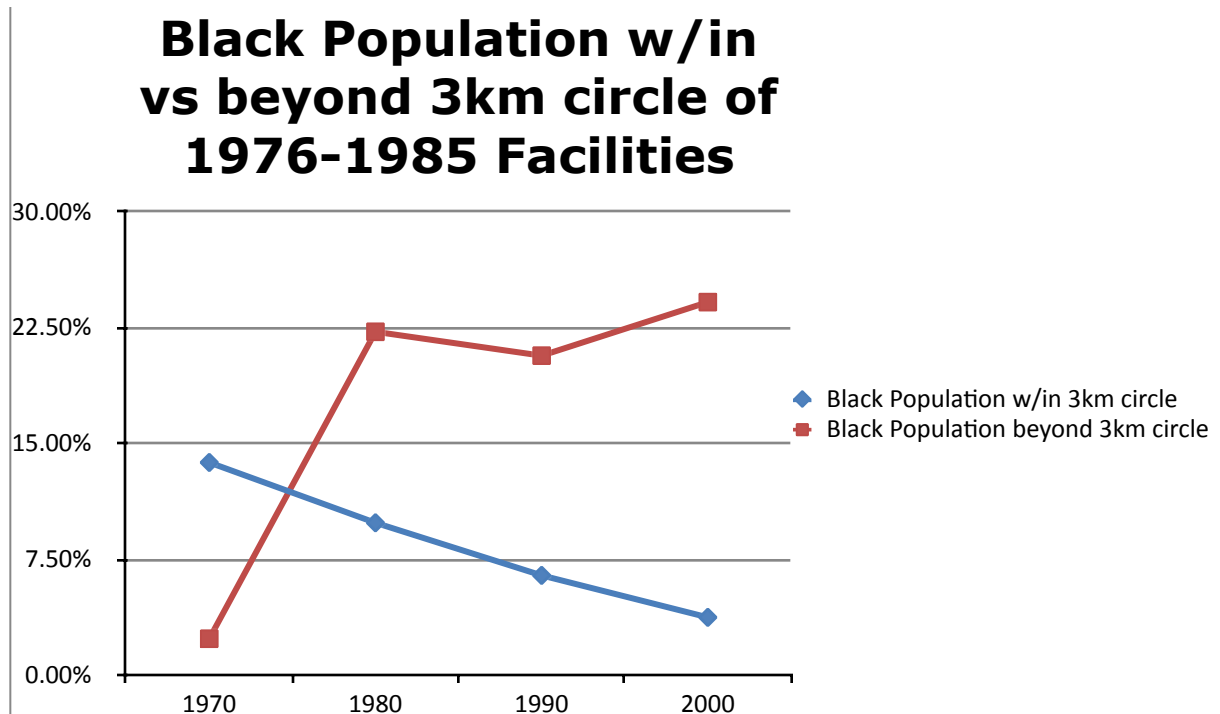


Figure 8-6 1980-2000 Asian Population Surrounding a Hazardous Waste Facility Sited between 1976-1985

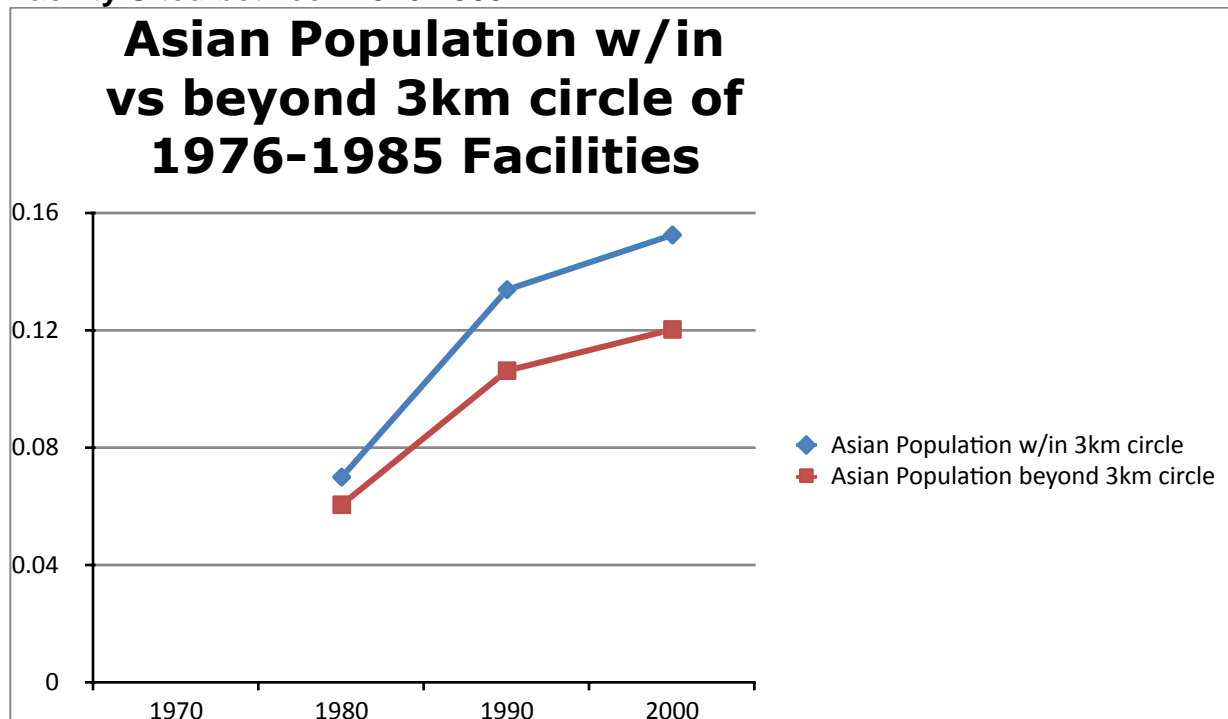


Figure 8-7 1970-2000 Hispanic Population Surrounding a Hazardous Waste Facility Sited between 1976-1985

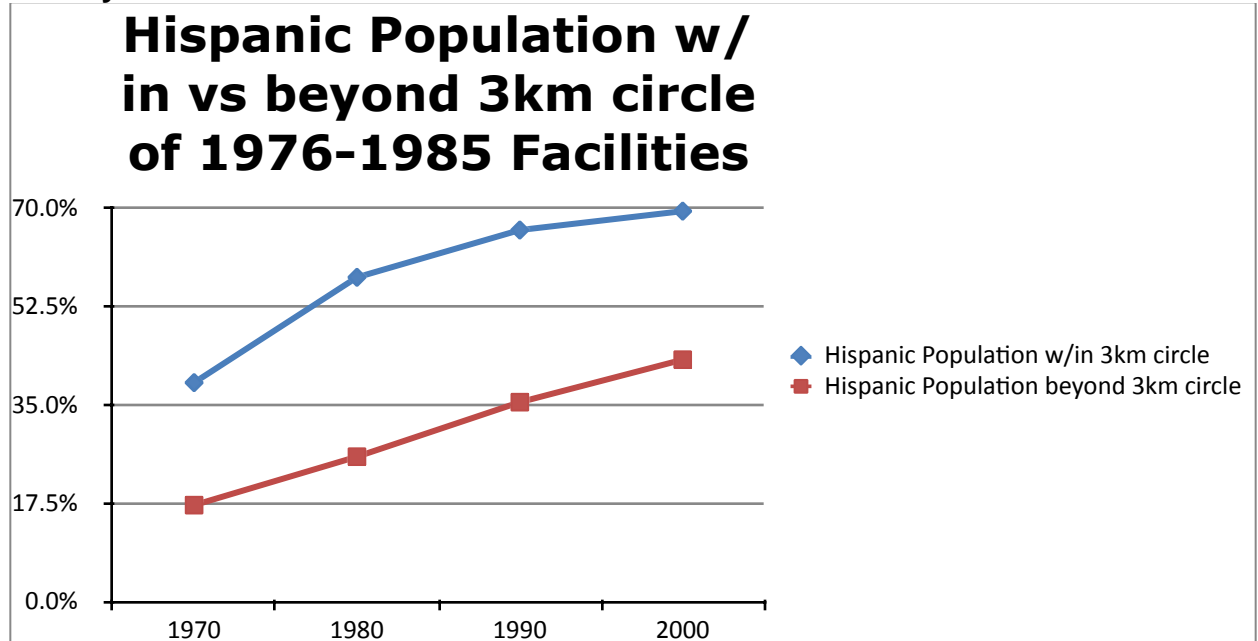


Figure 8-8 1970-2000 Non-Hispanic White Population Surrounding a Hazardous Waste Facility Sited between 1976-1985

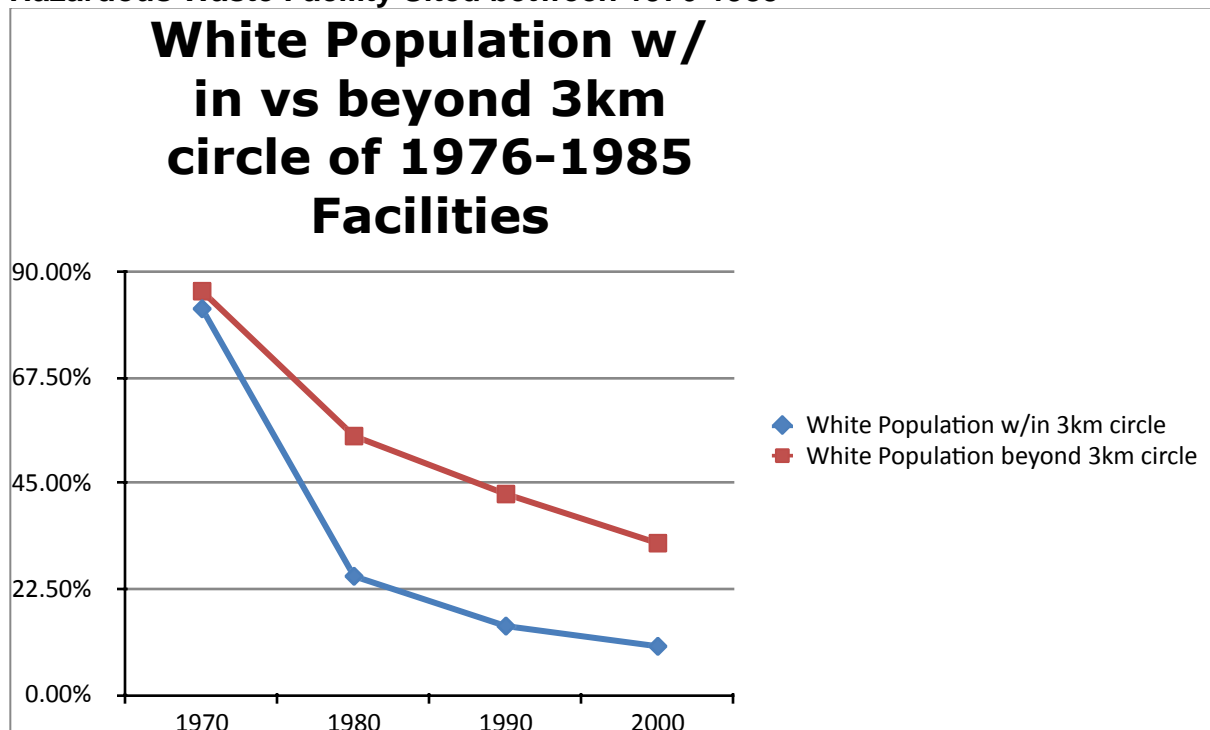


Figure 8-9 1970-2000 Foreign-born Population Surrounding a Hazardous Waste Facility Sited between 1976-1985

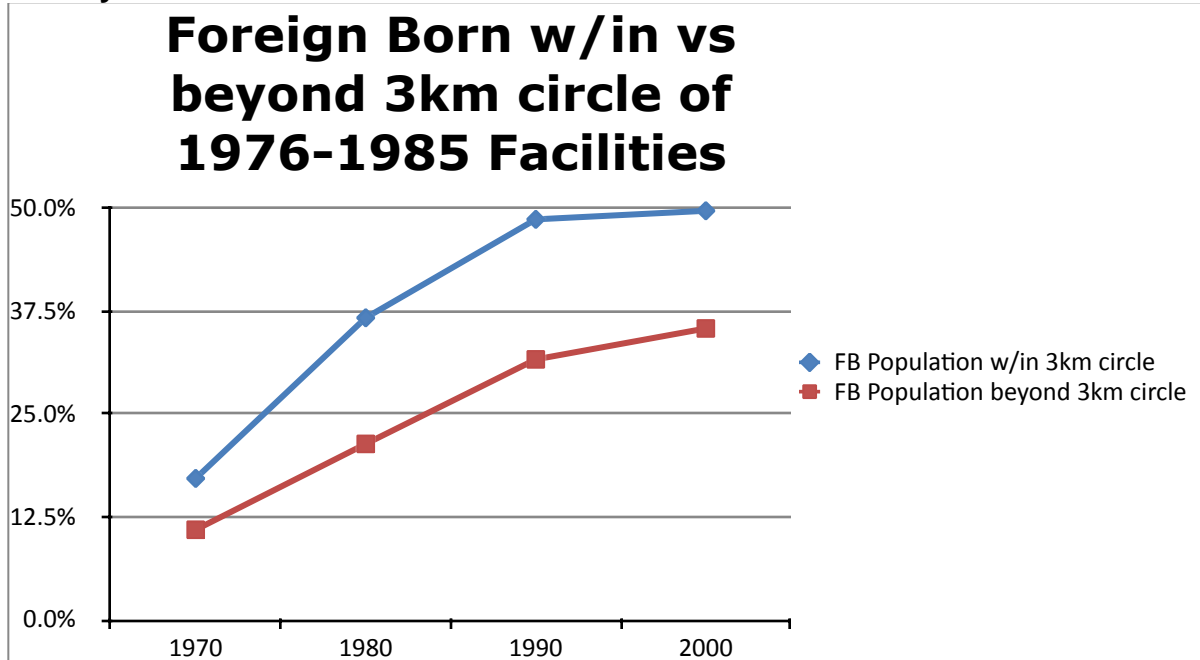


Figure 8-10 1980-2000 Non-English Speaking Population Surrounding a Hazardous Waste Facility Sited between 1976-1985

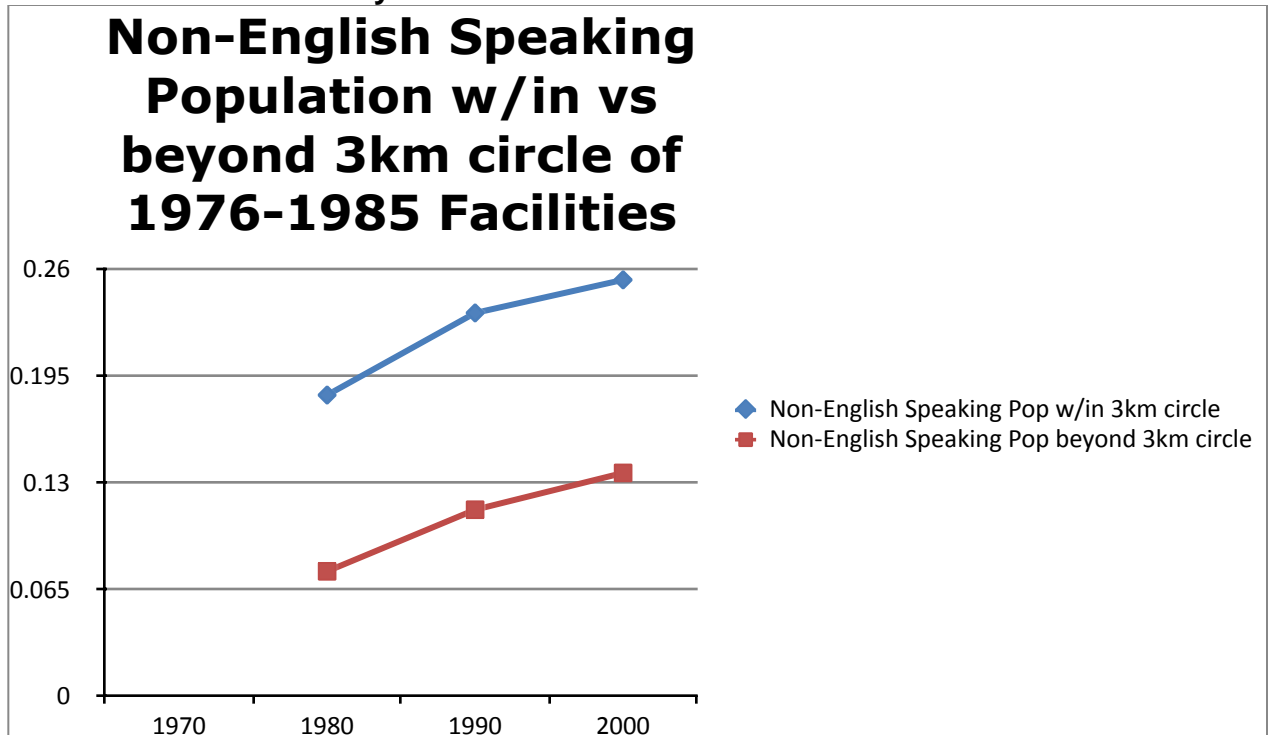


Table 8-4 Demographics of Tracts Surrounding 3km Radius of Facilities Sited Between 1976-1985 in Los Angeles County from 1970-2000 Census

	3km Circle for 1970	Beyond 3km 1970	3km Circle for 1980	Beyond 3km 1980	3km Circle for 1990	Beyond 3km 1990	3km Circle for 2000	Beyond 3km 2000
Total Population	397,439	6,618,970	438,029	7,034,976	527,806	8,334,702	549,475	8,969,863
Population Density	7,746	1,651	8,537	1,755	10,286	2,079	10,709	2,237
RACIAL VARIABLES								
% White alone	82.16%	85.90%	25.17%	55.03%	14.55%	42.68%	10.24%	32.22%
% black alone	13.78%	10.68%	9.88%	12.78%	6.48%	11.47%	3.76%	9.99%
% Asian/Pacific Islander alone	n/a	n/a	6.99%	6.05%	13.37%	10.61%	15.23%	12.02%
% Hispanic	39.0%	17.1%	57.73%	25.76%	66.15%	35.48%	69.52%	43.05%
% Mexican Origin	52.0%	37.8%	86.54%	78.58%	84.03%	75.28%	78.32%	71.06%
SOCIOECONOMIC VARIABLES								
Mean Household Income	\$8,555	\$11,331	\$16,578	\$22,371	\$33,899	\$47,934	\$46,022	\$62,605
% Persons below Poverty Level	16.7%	10.4%	20.91%	12.95%	22.48%	14.60%	25.07%	17.47%
% NH White Below Poverty	10.9%	7.6%	16.71%	9.52%	19.70%	10.17%	12.24%	8.44%
% Black Below Poverty	5.3%	2.4%	36.24%	22.24%	34.72%	20.69%	33.87%	24.16%
% Asian/Pacific Islander Below Poverty	n/a	n/a	12.17%	12.95%	16.12%	12.98%	15.76%	13.79%
% Hispanic Below Poverty	17.4%	14.1%	24.36%	19.99%	25.54%	12.62%	28.60%	15.55%
% Employed in Management, Professional, and Related Occupations	17.8%	26.7%	17.49%	28.26%	19.51%	31.57%	23.58%	34.90%
% Employed in Production, Transportation, & Material Moving Occupations	41.2%	31.1%	43.02%	28.51%	41.12%	27.11%	23.44%	20.38%
% Persons 25 yrs & over w/o HS Degree	52.9%	37.2%	49.58%	29.07%	51.13%	28.78%	49.66%	29.00%
% Persons 25 yrs & over w/ 4 Yr College Degree	7.6%	13.0%	10.85%	18.91%	12.45%	22.88%	14.69%	25.43%
% NHW Persons 25+ with 4 Yr College Degree or Higher	n/a	n/a	11.54%	21.02%	13.58%	26.13%	34.23%	37.78%
% Black Persons 25+ with 4 Yr College Degree or Higher	n/a	n/a	4.31%	11.38%	6.75%	15.09%	10.79%	18.00%
% API Persons 25+ with 4 Yr College Degree or Higher	n/a	n/a	34.94%	34.90%	30.55%	37.73%	31.92%	43.22%
% Hispanic Persons 25+ with 4 Yr College Degree or Higher	n/a	n/a	3.86%	5.99%	3.78%	6.31%	4.82%	6.98%
FOREIGN-BORN VARIABLES								
% Foreign born	17.2%	10.9%	36.70%	21.37%	48.67%	31.65%	49.71%	35.41%
% Persons 5+ that Speak Spanish and Speak English Not Well or Not at all	n/a	n/a	16.56%	6.07%	19.95%	9.30%	20.51%	10.46%
% Persons 5+ that Speak Asian/Other Language and Speak English Not Well or Not at all	n/a	n/a	1.78%	1.55%	3.38%	2.07%	4.83%	3.15%
% Persons 5+ that Speak English Not Well or Not at all	n/a	n/a	18.34%	7.62%	23.33%	11.37%	25.35%	13.61%
% Not a US Citizen of the Foreign Population	n/a	n/a	n/a	n/a	n/a	n/a	66.75%	61.56%
% Not a US Citizen of the Total	n/a	n/a	n/a	n/a	n/a	n/a	33.18%	21.80%

The Group 3 facilities are the hazardous waste facilities that were sited between 1986 and 1995. For these facilities the 1990 census data show the demographic conditions at the time of facility siting. Based on the results for this period, it could be concluded that once again the Black population was no longer the subject of discriminatory siting on part of the waste facilities sited in 1986-1995, nor were the Asian populations. The demographics of the tracts proximate to the siting of the 1986-1995 TSDFs, are that it is overwhelmingly Hispanic, equating to 95.20% Hispanic within 3 kilometers of the hazardous waste facilities. According to Table 8-5, the region is also made up of a high percentage of foreign-born (55.87% within 3 kilometers vs. 32.44% beyond the 3 kilometers of the waste facility), high percentage of non-English speaking (32.25% within 3 kilometers vs. 11.89% beyond the 3 kilometers of the waste facility), socioeconomically depressed, (27.10% within 3 kilometers vs. 14.95% beyond 3 kilometers of waste facility that's below poverty) (74.12% with no high school diploma within 3 kilometers vs. 29.64% beyond the 3 kilometers of the waste facility). It is also evident that in the decade post siting, the demographics are consistent and follow a similar trend. There is not much post-siting demographic shifts in these regions surrounding the hazardous waste facility at least in 2000.

The Group 3 facilities as a whole are a more pronounced demographic outcome of the demographics surrounding the Group 2 facilities. More specifically, with the group 3 facilities sited in 1986-1995, the results are much more obvious and extreme. For instance, the percentage of the African American populations have decreased even more, (just 1.06% Black) and the percentage of Hispanic (95.20%)

and non-assimilated foreign-born populations (55.87% foreign-born and 32.25% non-English speaking) are increased. The Group 3 facilities were therefore sited in a very specific demographic region reflected of a very specific group of non-assimilated immigrant minorities.

Figure 8-11 1970-2000 Black Population Surrounding a Hazardous Waste Facility Sited between 1986-1995

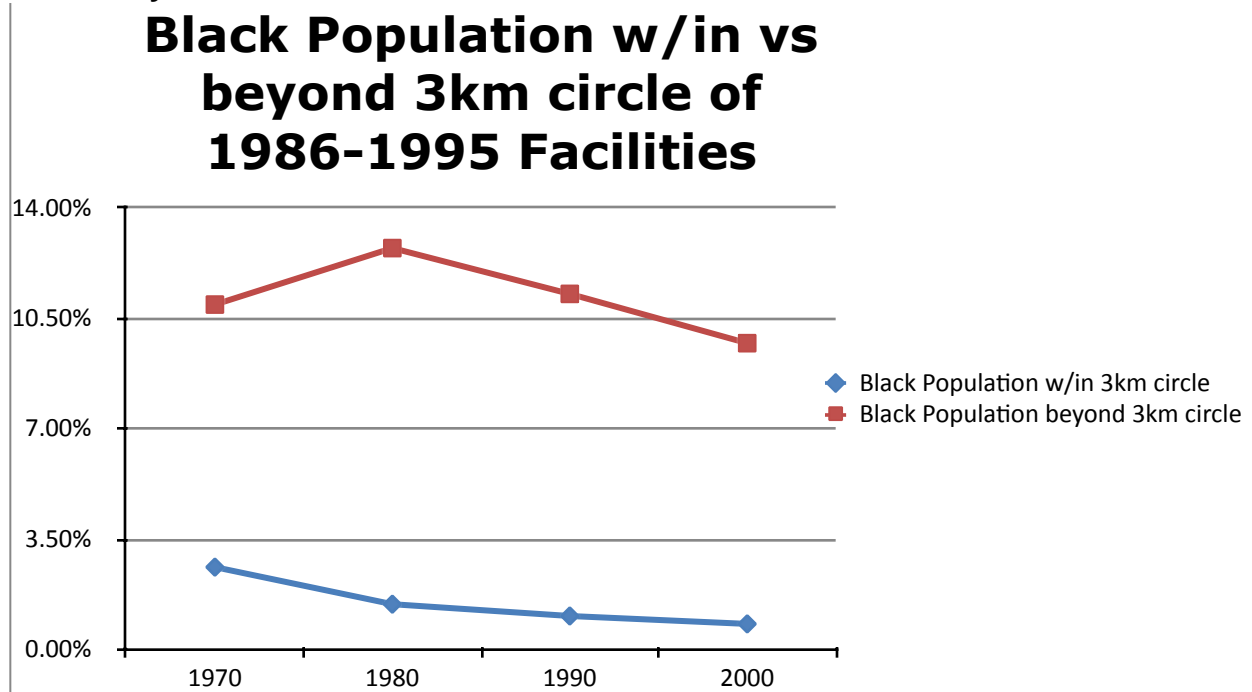


Figure 8-12 1980-2000 Black Population Surrounding a Hazardous Waste Facility Sited between 1986-1995

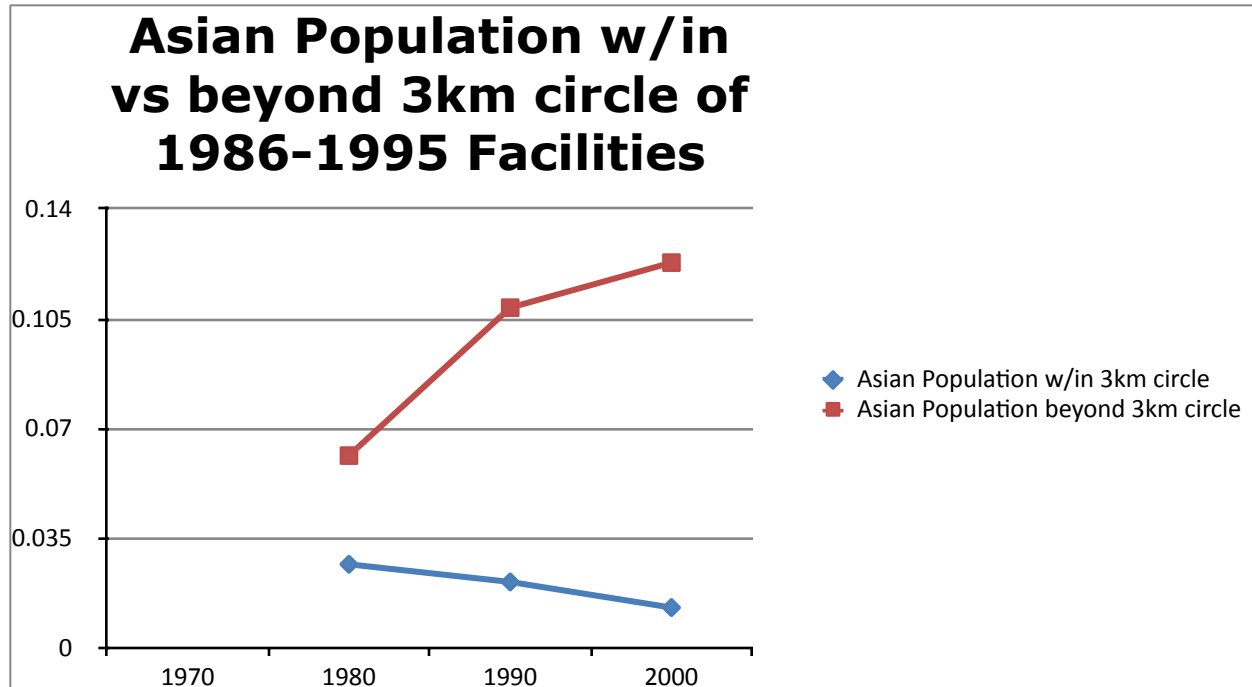


Figure 8-13 1970-2000 Hispanic Population Surrounding a Hazardous Waste Facility Sited between 1986-1995

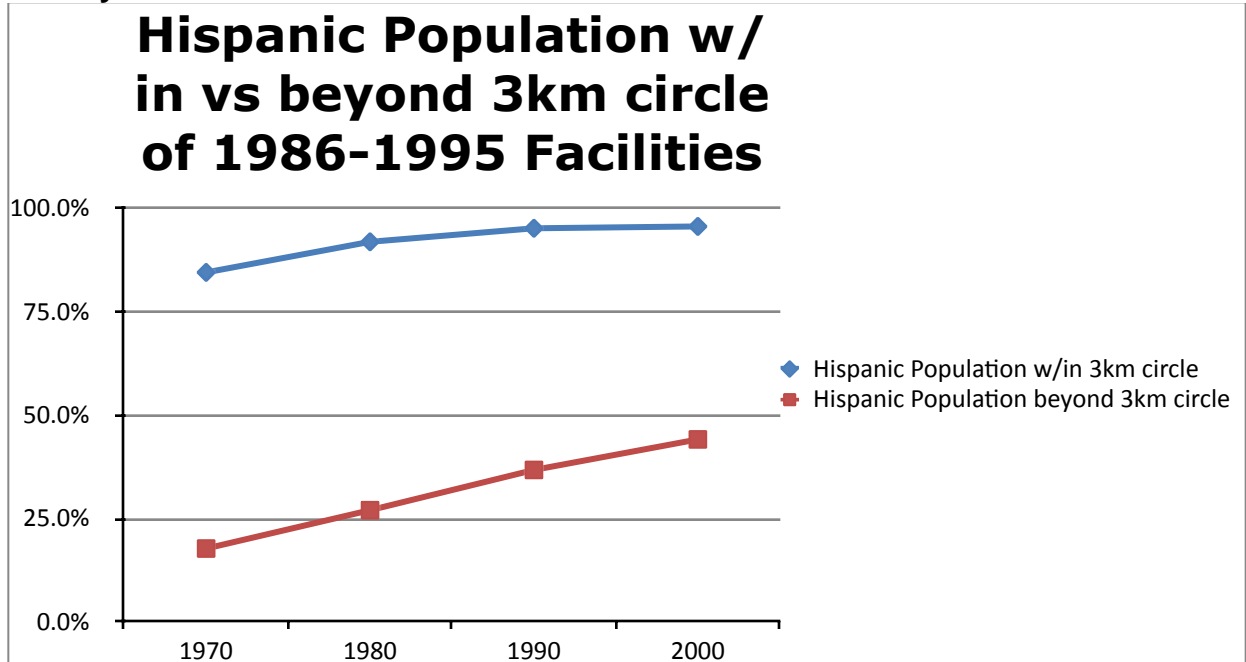


Figure 8-14 1970-2000 Non-Hispanic White Population Surrounding a Hazardous Waste Facility Sited between 1986-1995

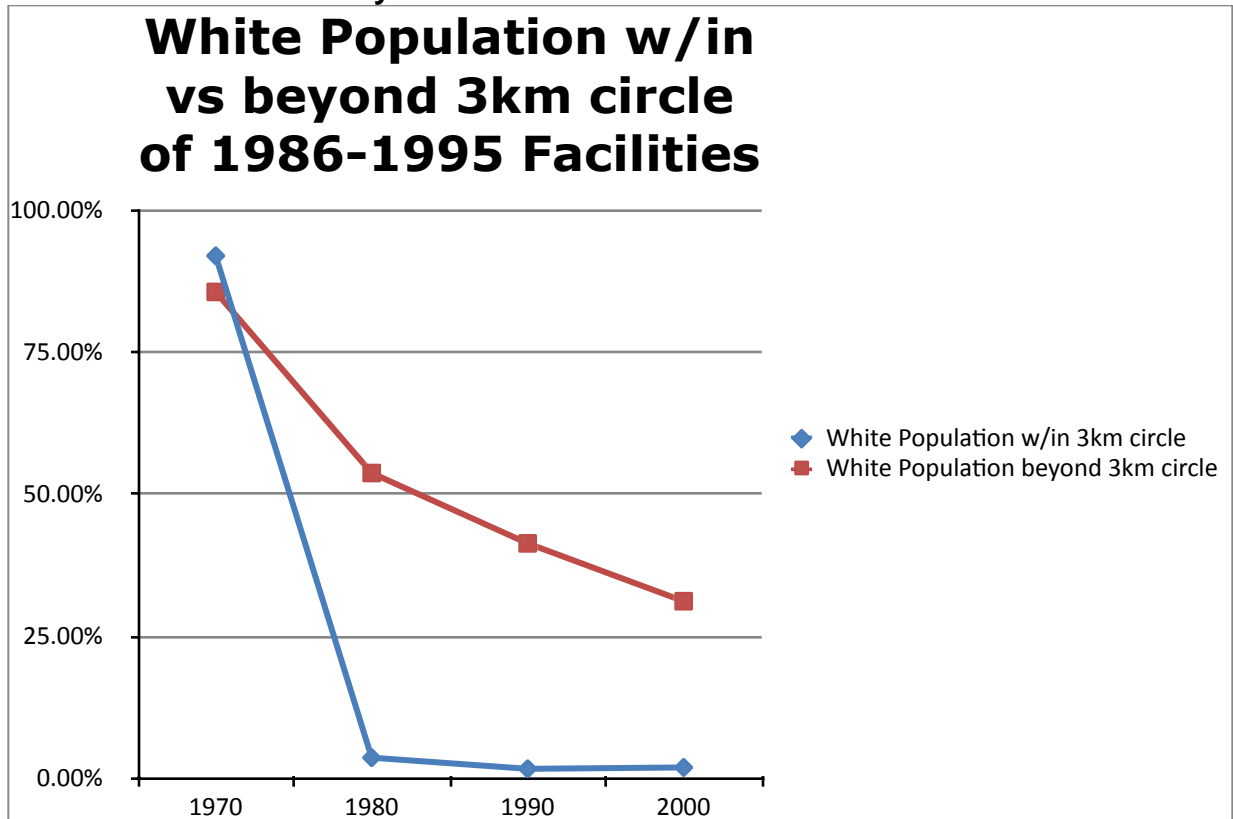


Figure 8-15 1970-2000 Non-Hispanic White Population Surrounding a Hazardous Waste Facility Sited between 1986-1995

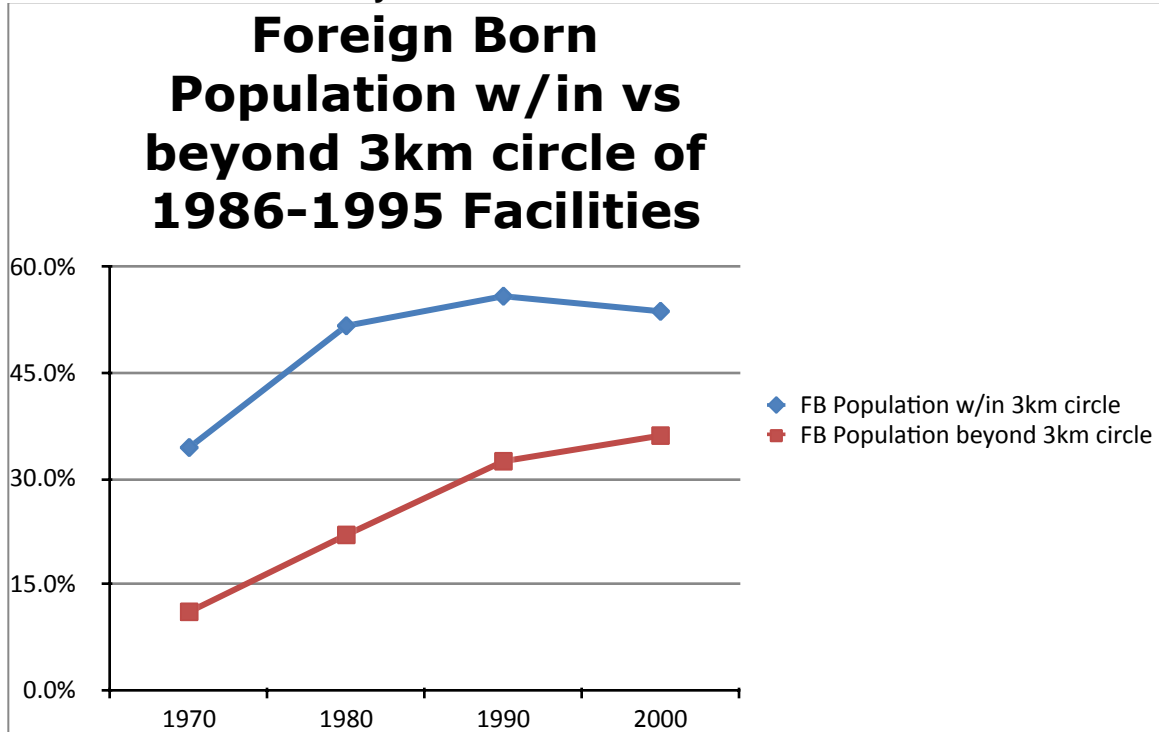


Figure 8-16 1970-2000 Non-Hispanic White Population Surrounding a Hazardous Waste Facility Sited between 1986-1995

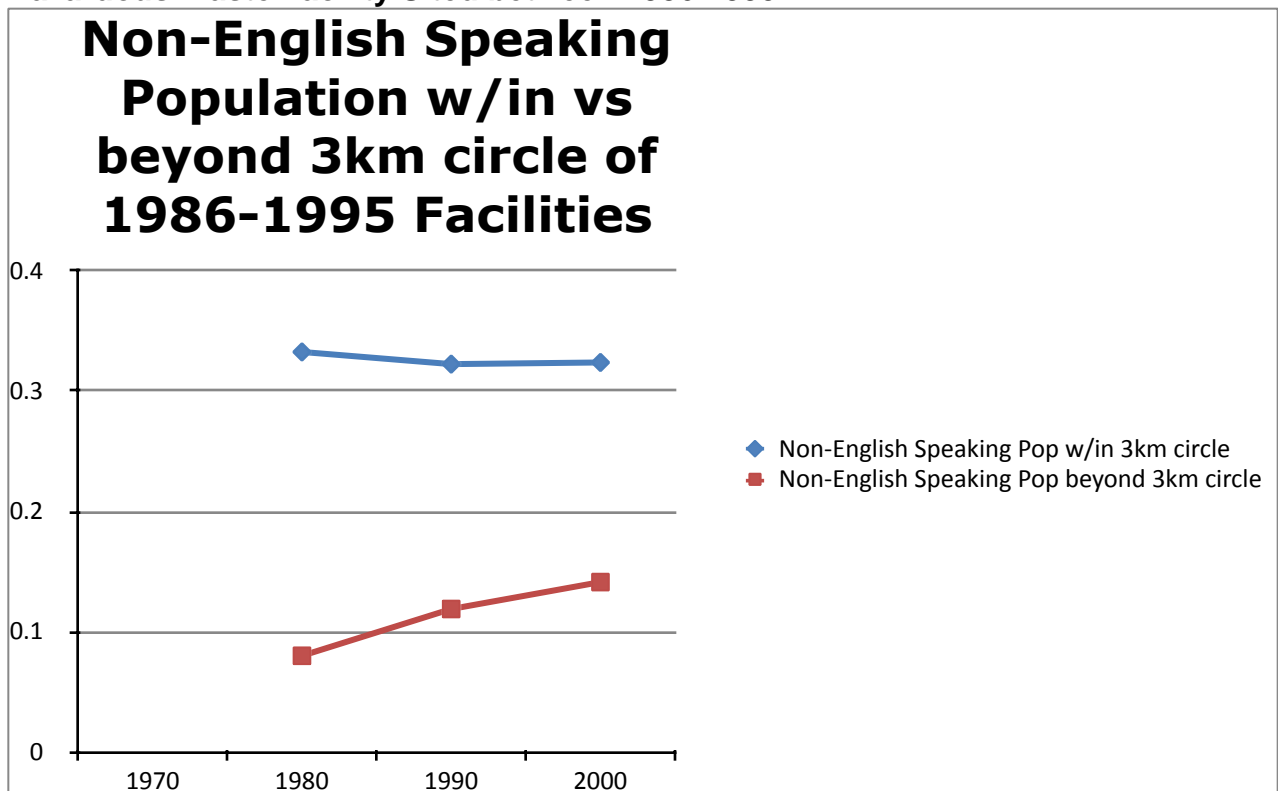


Table 8-5 Demographics of Tracts Surrounding 3km Radius of Facilities Sited Between 1986-1995 in Los Angeles County from 1970-2000 Census

	3km Circle for 1970	Beyond 3km 1970	3km Circle for 1980	Beyond 3km 1980	3km Circle for 1990	Beyond 3km 1990	3km Circle for 2000	Beyond 3km 2000
Total Population	64,794	6,951,615	71,332	7,401,673	82,946	8,779,562	81,411	9,437,927
Population Density	6,048	1,716	6,658	1,827	7,742	2,168	7,601	2,330
RACIAL VARIABLES								
% White alone	91.99%	85.63%	3.66%	53.76%	1.70%	41.38%	1.94%	31.20%
% black alone	2.61%	10.93%	1.43%	12.72%	1.06%	11.27%	0.81%	9.71%
% Asian/Pacific Islander alone	n/a	n/a	2.68%	6.14%	2.11%	10.86%	1.30%	12.30%
% Hispanic	84.5%	17.7%	91.93%	27.02%	95.20%	36.76%	95.65%	44.14%
% Mexican Origin	69.1%	38.2%	93.34%	79.10%	91.97%	75.82%	84.24%	71.48%
SOCIOECONOMIC VARIABLES								
Mean Household Income	\$ 7,209	\$ 11,204	\$ 13,995	\$ 22,126	\$ 27,214	\$ 47,381	\$ 35,497	\$ 61,974
% Persons below Poverty Level	21.0%	10.6%	25.81%	13.30%	27.10%	14.95%	31.82%	17.79%
% NH White Below Poverty	19.2%	7.7%	23.47%	9.78%	29.52%	10.42%	27.25%	8.51%
% Black Below Poverty	1.0%	2.6%	38.26%	22.87%	35.29%	21.17%	51.77%	24.36%
% Asian/Pacific Islander Below Poverty	n/a	n/a	17.18%	12.88%	13.35%	13.21%	34.66%	13.92%
% Hispanic Below Poverty	22.1%	14.2%	26.15%	20.34%	27.49%	20.63%	31.71%	22.48%
% Employed in Management, Professional, and Related Occupations	7.4%	26.4%	7.09%	27.87%	9.41%	31.11%	11.73%	34.47%
% Employed in Production, Transportation, & Material Moving Occupations	58.1%	31.4%	60.85%	29.01%	54.60%	27.64%	28.79%	20.48%
% Persons 25 yrs & over w/o HS Degree	75.1%	37.7%	74.50%	29.81%	74.12%	29.64%	70.57%	29.80%
% Persons 25 yrs & over w/ 4 Yr College Degree	2.4%	12.8%	2.81%	18.60%	3.37%	22.46%	4.34%	25.01%
% NHW Persons 25+ with 4 Yr College Degree or Higher	n/a	n/a	2.56%	20.70%	3.23%	25.78%	24.44%	37.71%
% Black Persons 25+ with 4 Yr College Degree or Higher	n/a	n/a	3.31%	11.05%	3.08%	14.82%	8.41%	17.85%
% API Persons 25+ with 4 Yr College Degree or Higher	n/a	n/a	14.28%	35.02%	17.01%	37.24%	28.14%	42.39%
% Hispanic Persons 25+ with 4 Yr College Degree or Higher	n/a	n/a	1.96%	5.86%	2.40%	6.14%	3.07%	6.86%
FOREIGN-BORN VARIABLES								
% Foreign born	34.4%	11.1%	51.67%	21.99%	55.87%	32.44%	53.73%	36.09%
% Persons 5+ that Speak Spanish and Speak English Not Well or Not at all	n/a	n/a	32.18%	6.43%	31.68%	9.72%	32.00%	10.86%
% Persons 5+ that Speak Asian/Other Language and Speak English Not Well or Not at all	n/a	n/a	1.08%	1.57%	0.57%	2.17%	0.39%	3.27%
% Persons 5+ that Speak English Not Well or Not at all	n/a	n/a	33.26%	8.00%	32.25%	11.89%	32.39%	14.13%
% Not a US Citizen of the Foreign Population	n/a	n/a	n/a	n/a	n/a	n/a	77.13%	61.78%
% Not a US Citizen of the Total	n/a	n/a	n/a	n/a	n/a	n/a	41.44%	22.29%

The spatial maps from 1970-2000 showing the concentrations of the different races for each decade with an overlay of color coordinated points depicting the location of each of the facilities by the decade groups they were sited in. For Figures 8-16 to 8-27, there are four groups of facilities shown in the maps: facilities sited between 1966-1975 (in yellow), facilities sited between 1976-1985 (in blue), facilities sited between 1986-1995 (in red), and facilities that were sited before 1966 (in purple). In the longitudinal analysis the facilities sited before 1966 were not included, because the census demographic analysis portion of the study could not be completed as this would require looking at older census data (1960 and prior) to analyze the present-day demographics. There is unfortunately no access to those data in the datasets we were implementing. However in spatial map form, we included the pre-1966 sited facilities, so that we can get a general idea of what tracts the older facilities were sited in. The tracts were color coded in monochromatic shades of gray. The lightest gray is for tracts housing 0-10% of one race equating to “low” concentrations, the second lightest gray is for tracts with 10-30% of one race equating to “medium” concentrations of one race, the third lightest gray depicts the tracts with 30-60% of one race equating to “high” concentrations of one race and lastly the darkest grays show the tracts with concentrations greater than 60% of one race equating to “very high” concentrations of one race. These divisions were uniform across all decades and race maps.

According to the 1970s maps the African Americans (Figure 8-16) and Hispanics (Figure 8-17) mostly lived in different regions. The African Americans lived more west and the Hispanics more east and northeast of Los Angeles County. The group 1 facilities sited between 1966-1975 were sited mostly in African American and some

mixed race African American and Hispanic Tracts. However facilities sited in 1966-1975, were in close proximity to a very concentrated African American population.

Figure 8-17 TSDFs by Dates Sited and Percent Black in 1970

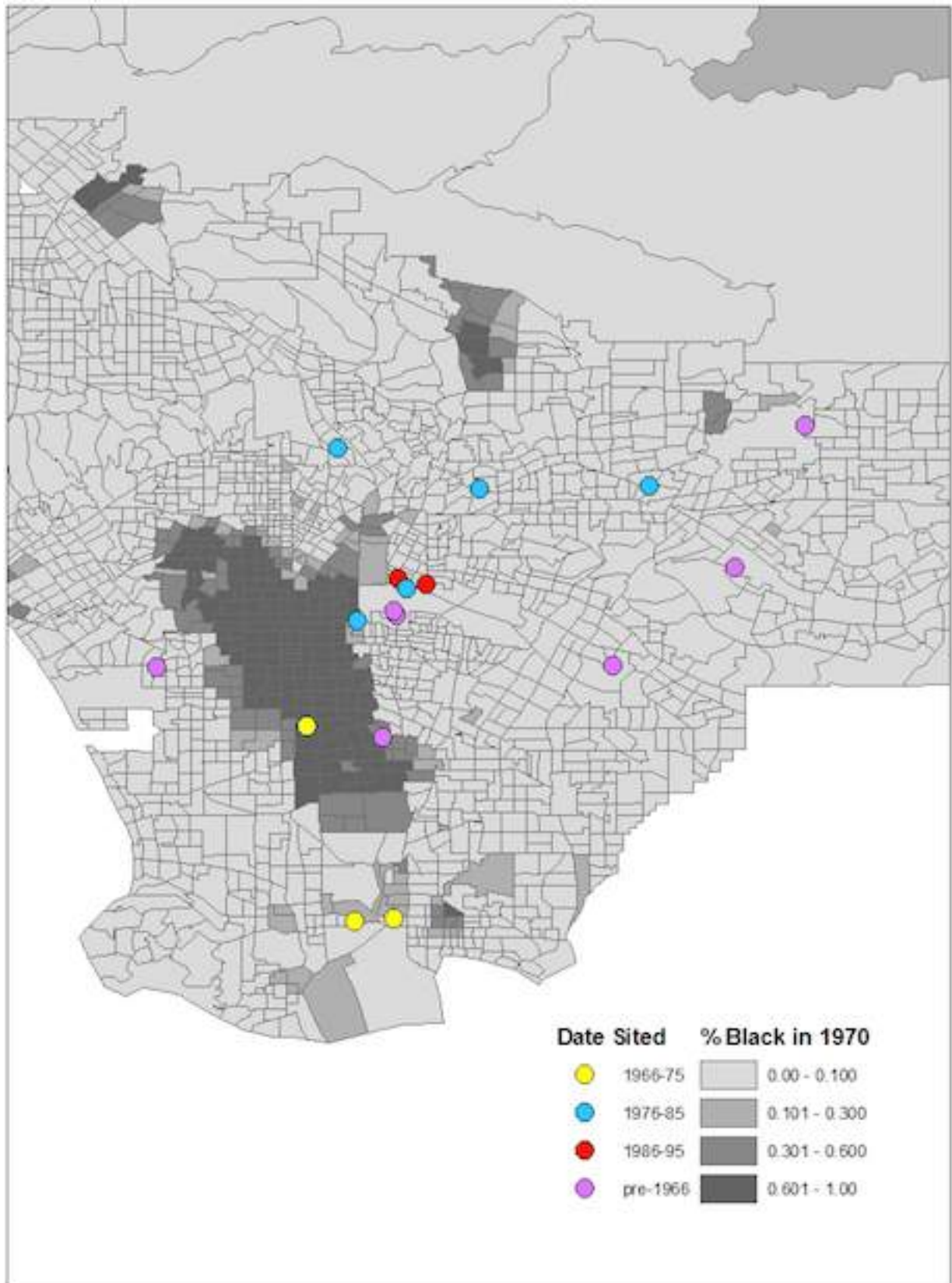
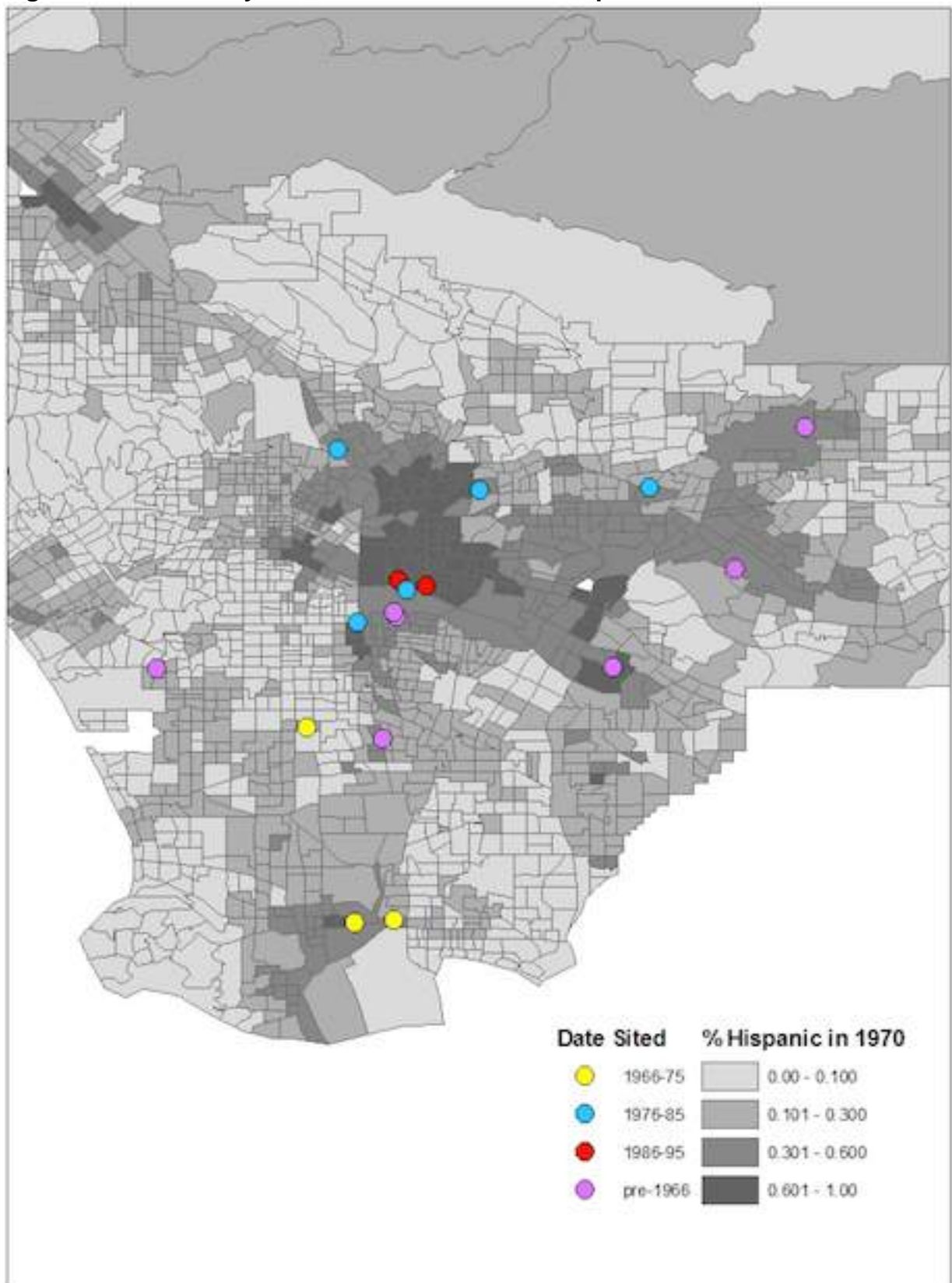


Figure 8-18 TSDFs by Dates Sited and Percent Hispanic in 1970



This is no longer the case by the 1980s, where the shift in the more marginalized racial groups occurred from African American to Hispanic. In Figure 8-18 to Figure 8-20, the African American population has a larger cluster of concentrated tracts and one of the larger tracts surrounding the previously group 1 sited facility in 1966-1975, is more concentrated with African Americans than the prior decade. This pattern is much more pronounced with the Hispanic category in terms of population concentration. In Figure 8-19, the Hispanic population clearly shows growth and greater concentration across many tracts. It is also evident that the Hispanic populations has grown in concentration around the previous group 1 sited facilities and have even moved into some highly African American tracts as well. For the most part Los Angeles County in 1980 still shows very segregated racial concentrations, especially on part of the African Americans who are concentrated in a few pockets of regions.

On the hazardous waste facility siting, however, it is evident that almost all of the Group 2 facility sitings (1976-85), shown by the blue dots in these figures, were sited in predominantly Hispanic concentrated tracts. Although there are a handful of tracts which abut African American concentrated tracts, the majority of the tracts surrounding the facilities sited in Group 2 are concentrated with high to very high percentages of Hispanics. The Asian population as shown in Figure 8-20 show some low concentrations between the 10-30% range in some of the tracts with these facilities. The facilities are not sited in the few clusters of high Asian concentration tracts however according to the spatial maps.

Figure 8-19 TSDFs by Dates Sited and Percent African American in 1980

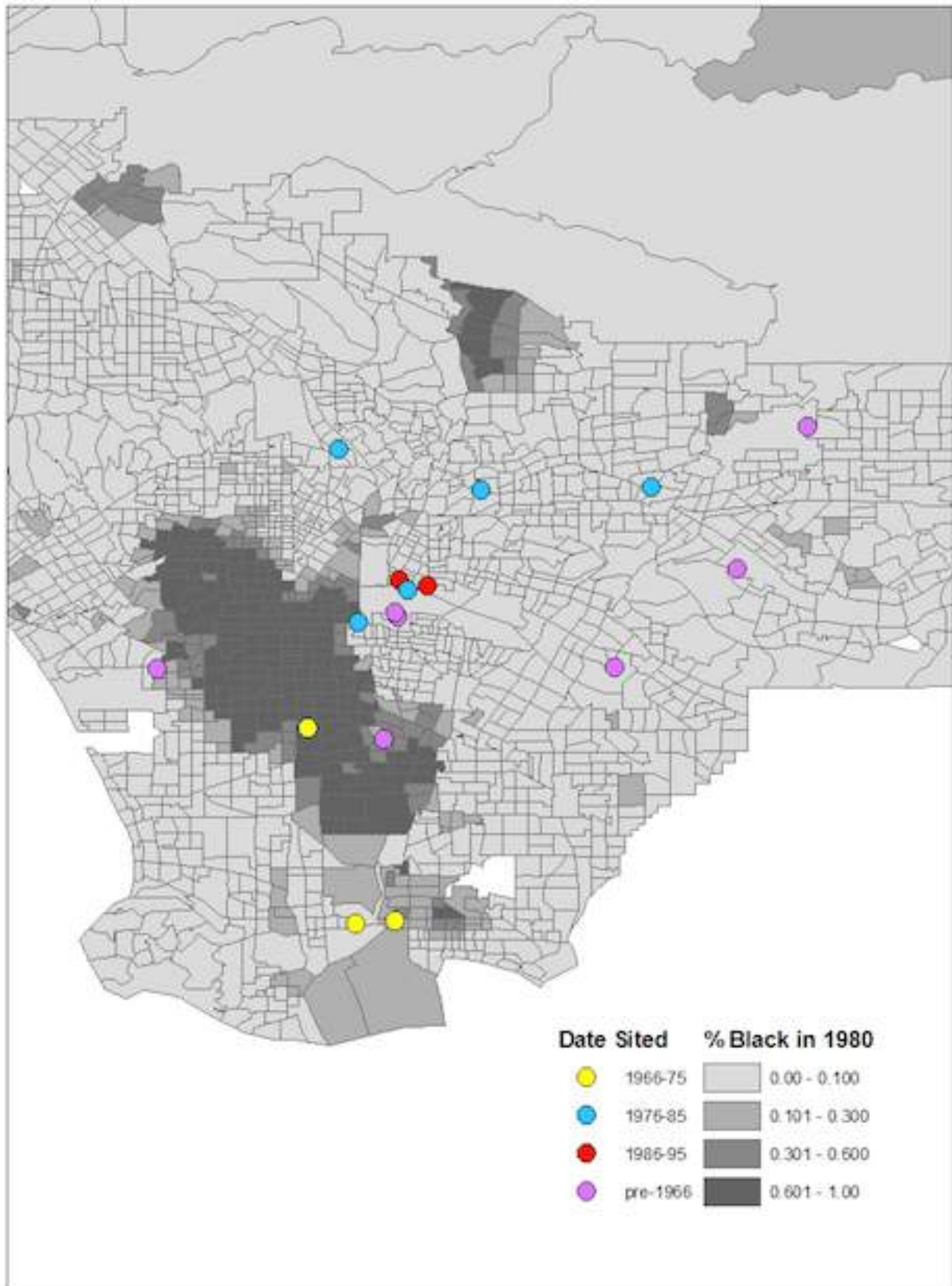


Figure 8-20 TSDFs by Dates Sited and Percent Hispanic in 1980

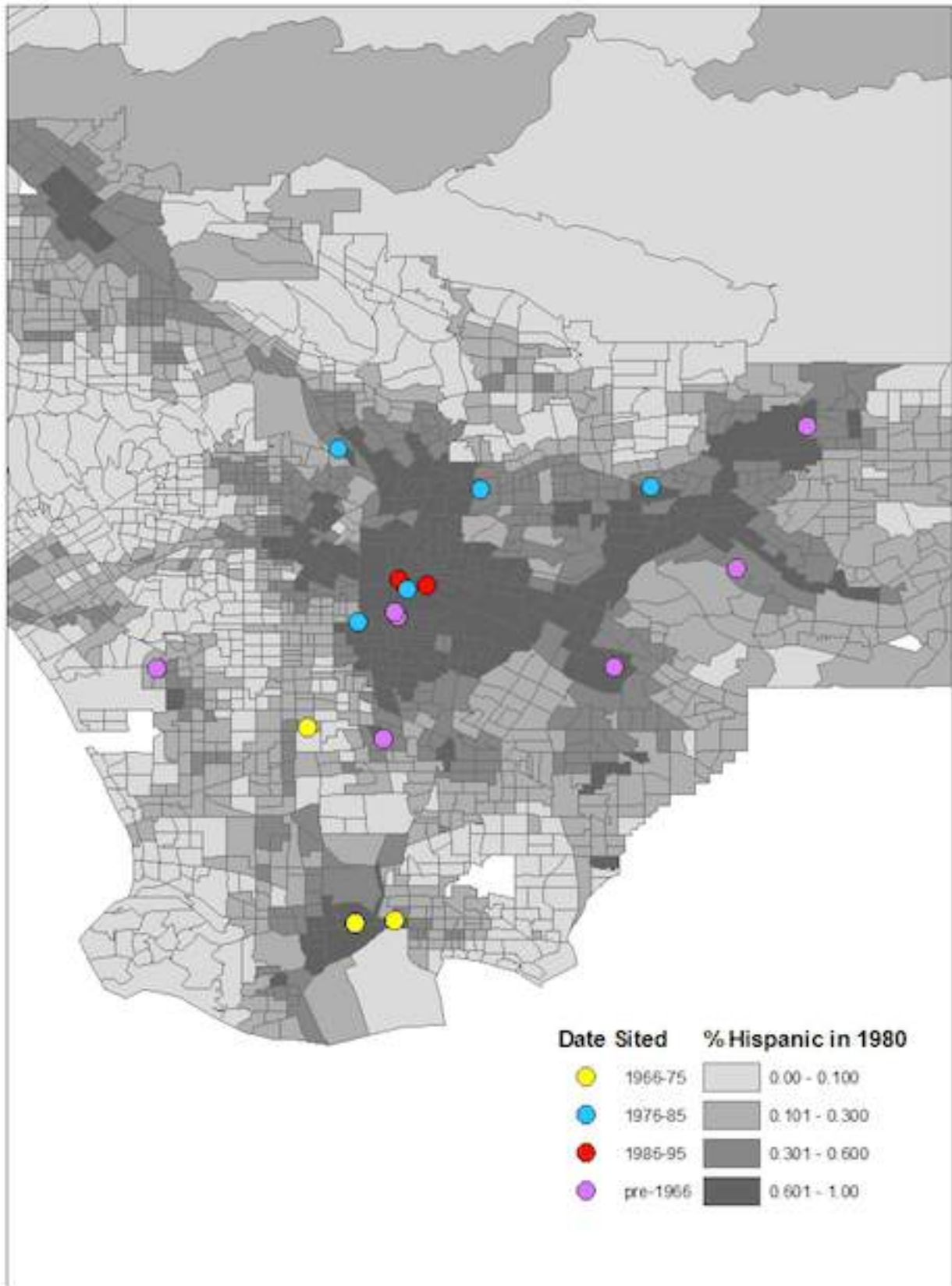
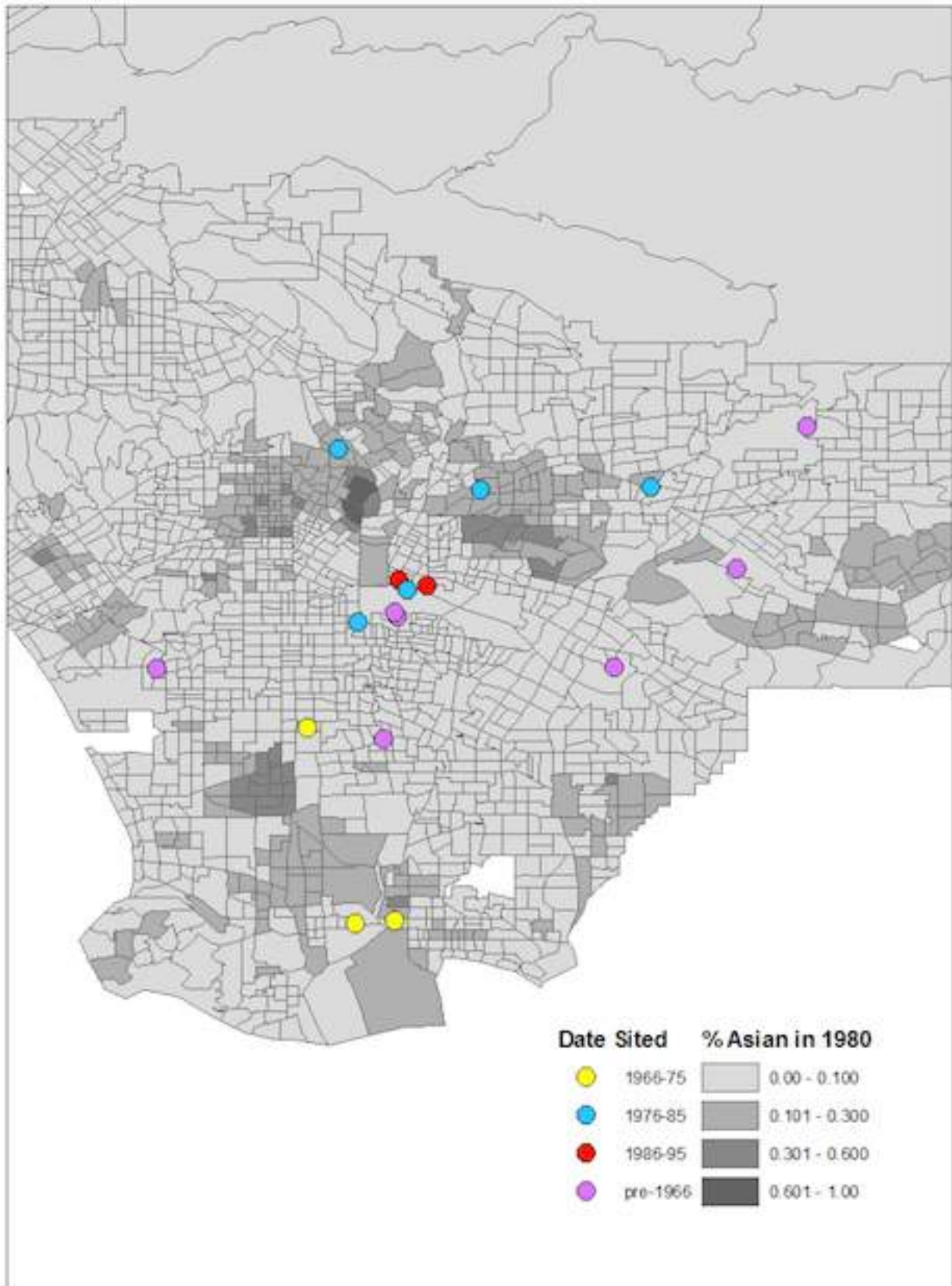


Figure 8-21 TSDFs by Dates Sited and Percent Asian in 1980



By the 1990s, Figures 8-21 to 8-23, the spatial maps show that there is a general decline in the African American concentrations (Figure 8-21) as a whole and a large increase in the Hispanic populations (Figure 8-22). There are also increased concentrations in the Asian population as well (Figure 8-23). With that said, there is by far the largest growth in Hispanic concentrated tracts. The red dots in all maps depict the facilities sited in Group 3, 1986-1995. These are the tracts that are the most recently sited among the group of 17 facilities in Los Angeles County. These spatial maps show very clearly that these new Group 3 facilities were sited right in the center of the very high Hispanic concentrated tracts. These tracts are almost entirely Hispanic with no mixing of high concentrations of African Americans or Asians.

Figure 8-22 TSDFs by Dates Sited and Percent African American in 1990

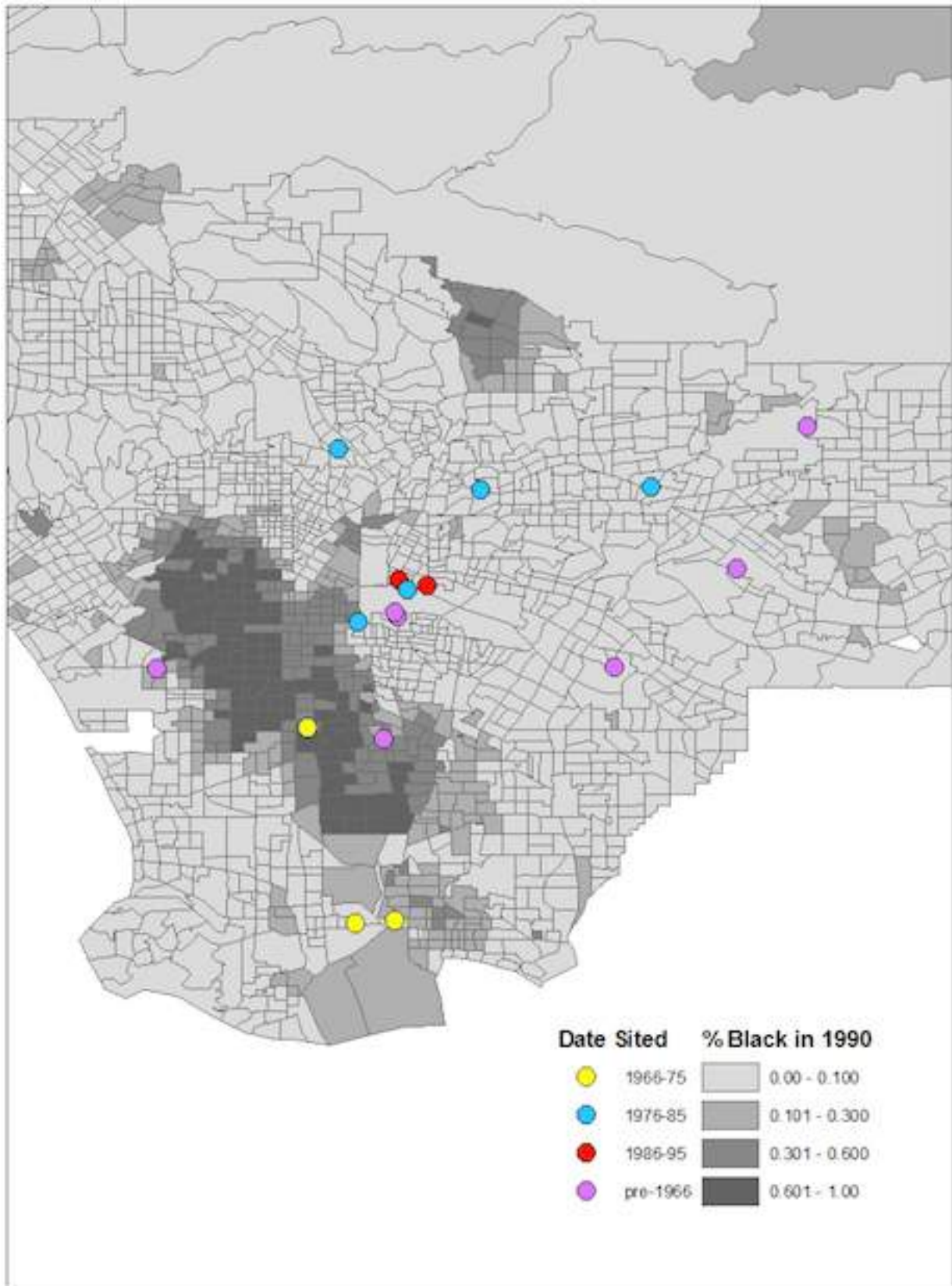


Figure 8-23 TSDFs by Dates Sited and Percent Hispanic in 1990

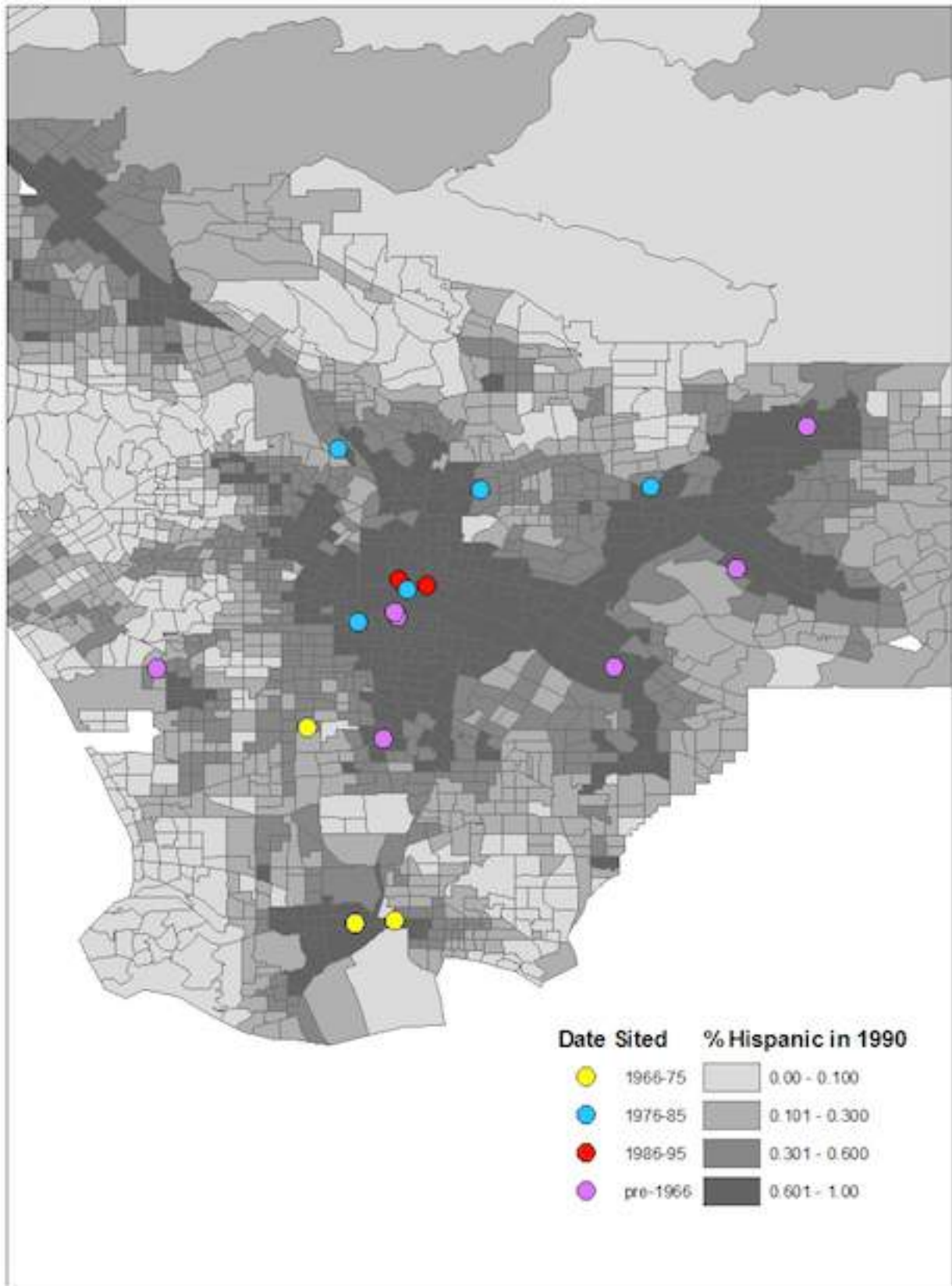
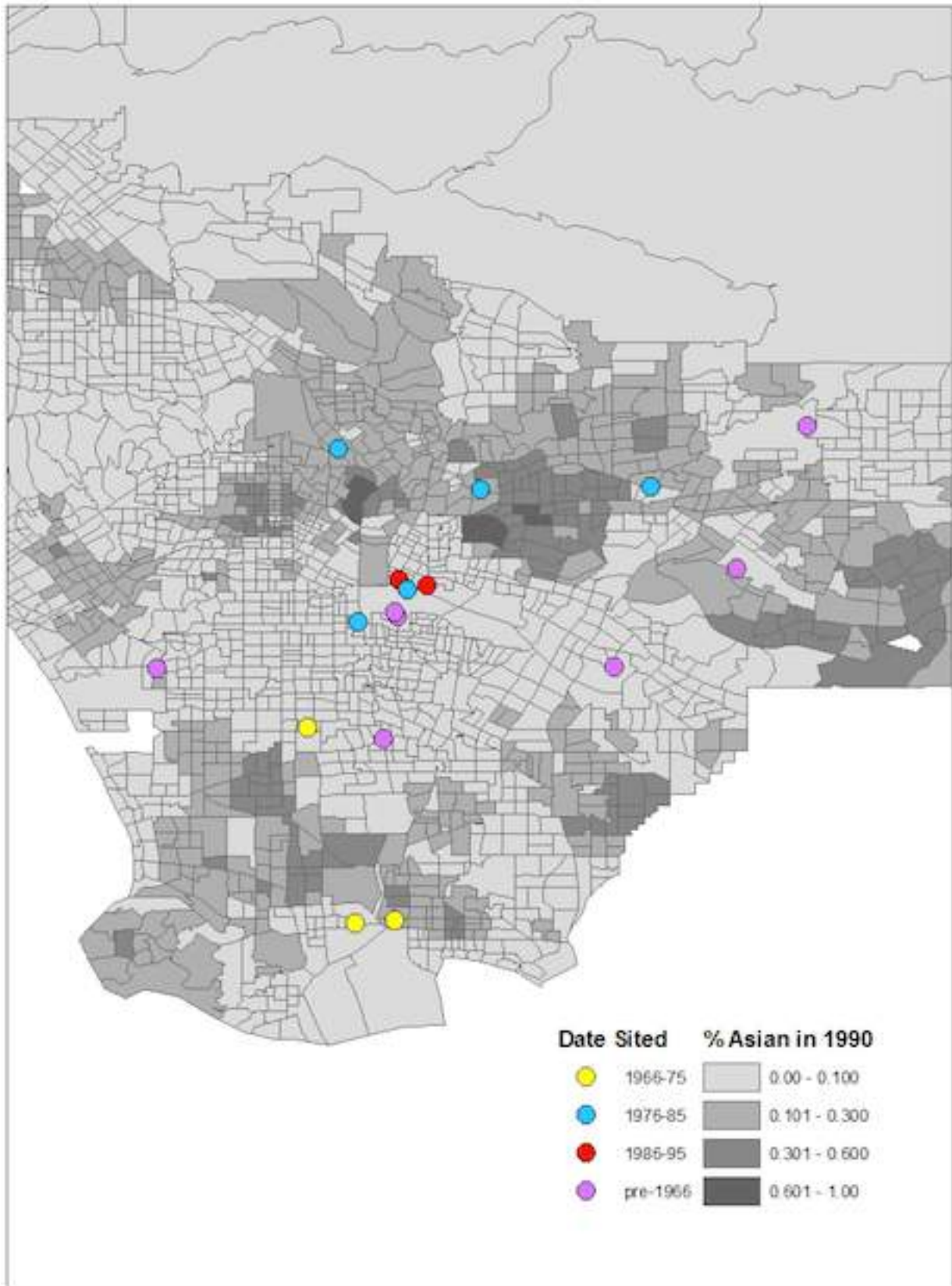


Figure 8-24 TSDFs by Dates Sited and Percent Asian in 1990



By the 2000 Census, Figures 8-24 to 8-26 show even more drastic population concentration changes as observed in the prior decades. The Hispanic concentrated tracks have increased even further and grown to cover a large percentage of the whole county (Figure 8-25). The Asian concentrations have also increased throughout Los Angeles County, although they have mostly expanded in the clustered areas in the Southwest and Northeast (Figure 8-26). The African American concentrations have drastically decreased especially in relation to the 1970 census (Figure 8-24). African American clusters still exist, however they are much smaller and more concentrated in two major areas. Also, by the year 2000, the facilities that were sited in 1966-1975 in the largely African American tracts (shown in yellow on maps), are no longer as high in African American concentration. This suggests that many of the African Americans have moved out of these polluted areas. Instead these tracts have been replaced by Hispanic populations. In the 2000 spatial maps, it is evident that many of the TSDFs throughout Los Angeles County are becoming more highly concentrated with Hispanic populations suggesting that Hispanic populations are moving into certain areas regardless of the fact that it may house a hazardous waste site. The Asian population shows some similar trends of population growth in their clustered areas, but the growth is not as drastic and not nearly as concentrated near the hazardous waste facilities as with the Hispanic population.

Figure 8-25 TSDFs by Dates Sited and Percent African American in 2000

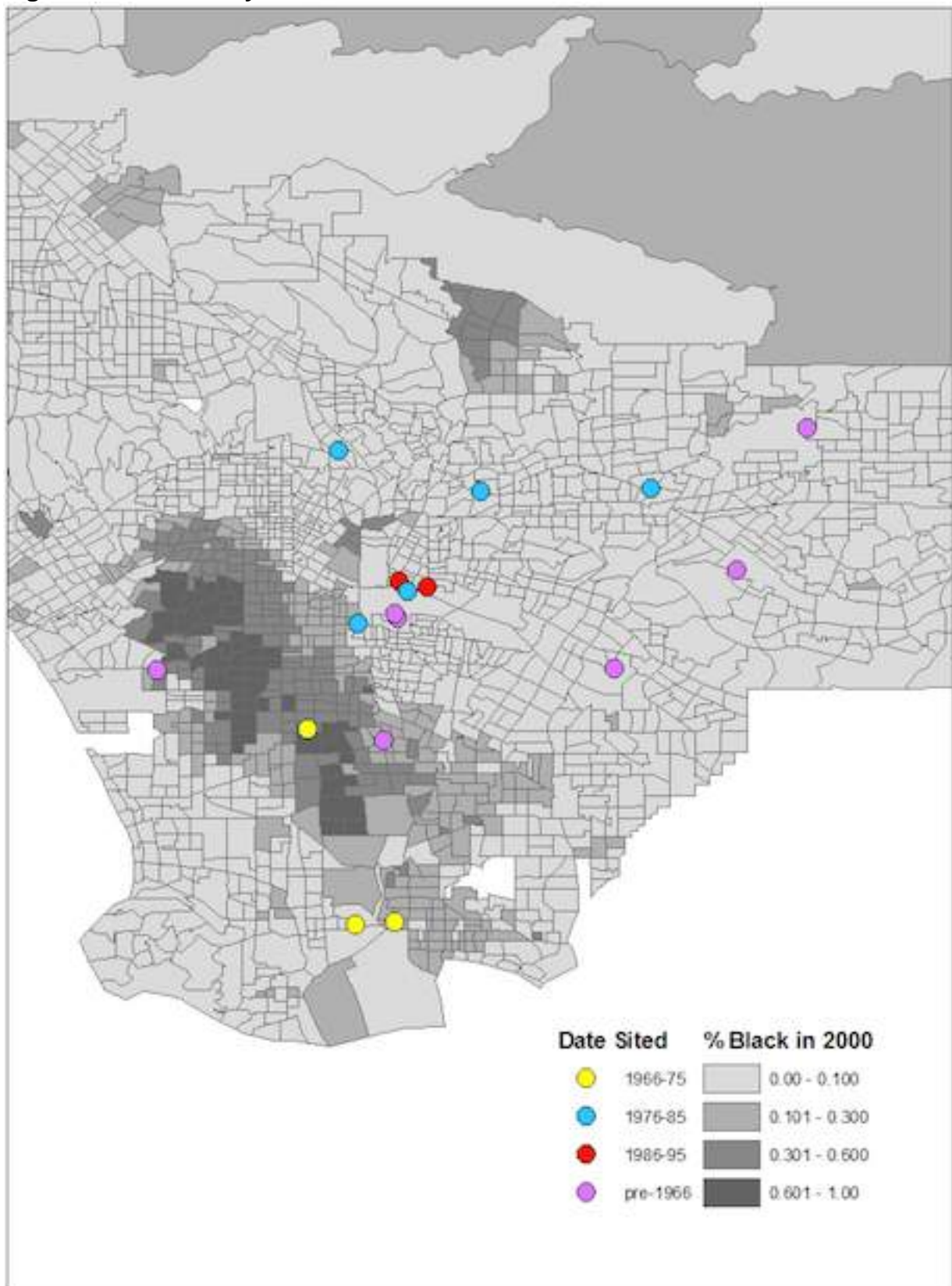


Figure 8-26 TSDFs by Dates Sited and Percent Hispanic in 2000

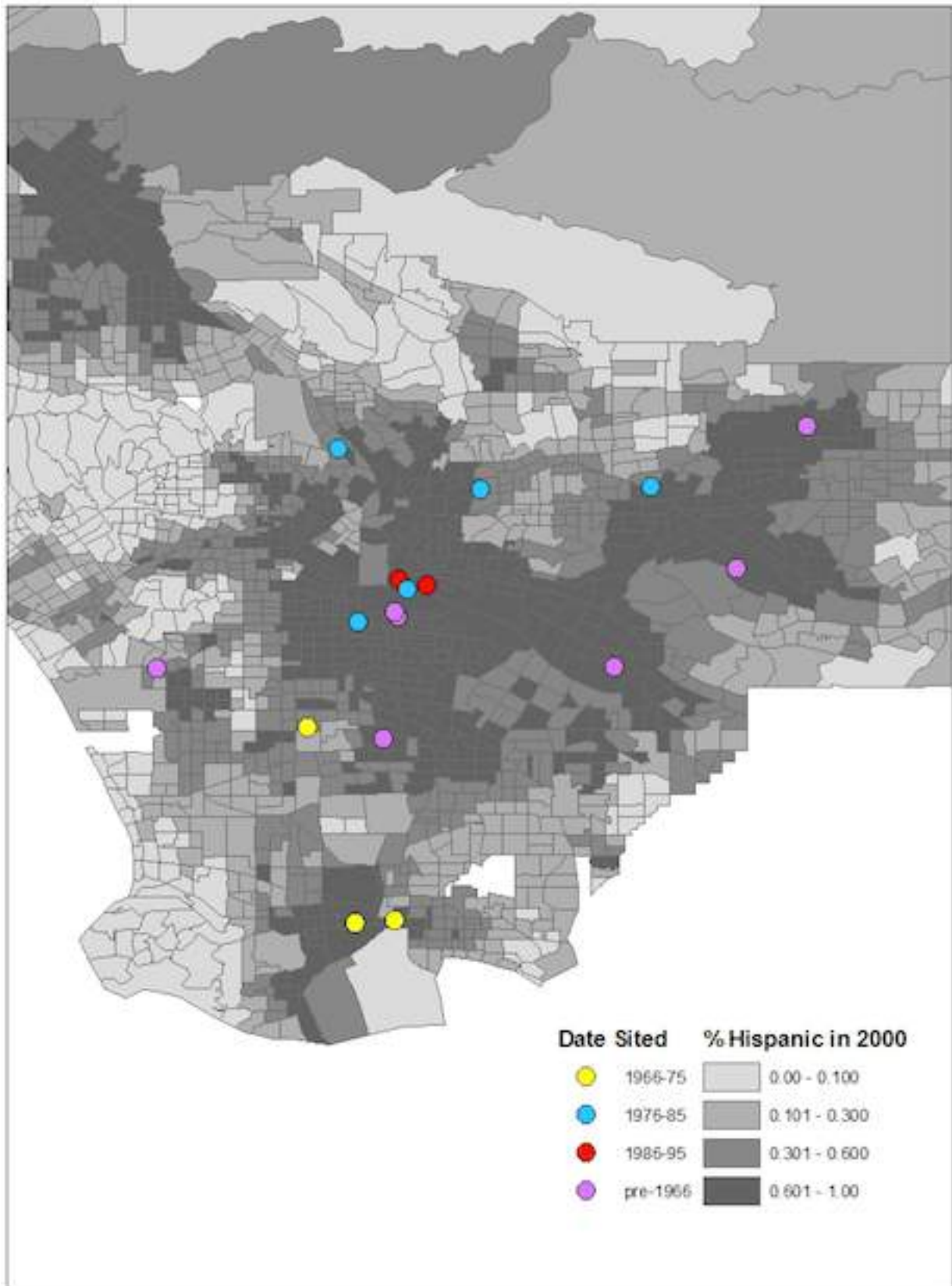
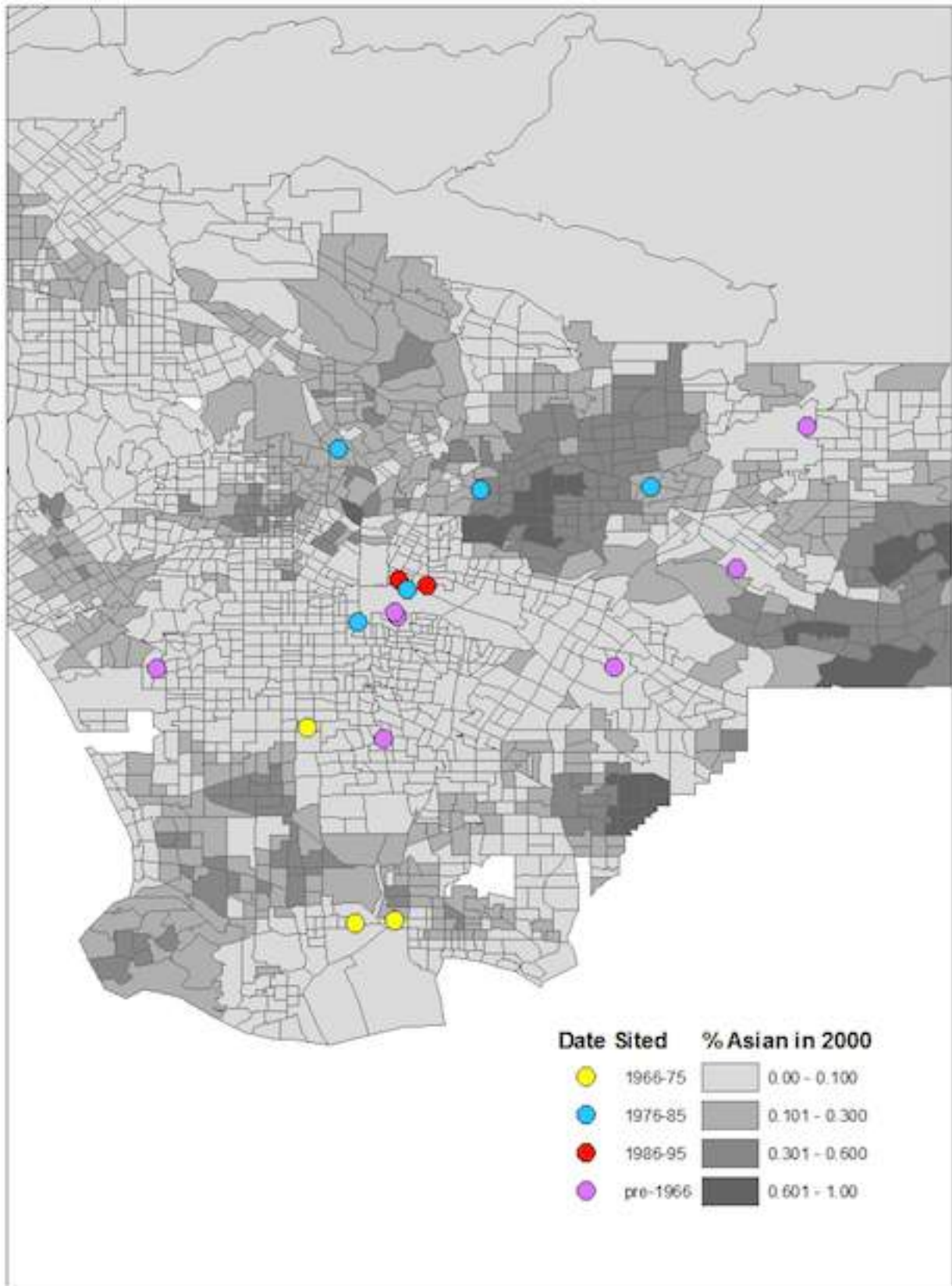


Figure 8-27 TSDFs by Dates Sited and Percent Asian in 2000



8-3 Conclusion

This chapter offered a more in depth look into the location of hazardous waste facilities, and the demographics that surround them by the observation of more specific racial and foreign-born categories in the form of a longitudinal analysis. By breaking up the years in which the TSDFs were sited into 3 categories of decades, and analyzing them longitudinally against the census data from 1970-2000, questions of discriminatory siting versus post-siting demographic change were explored in a more pronounced way. Results of the grouped facility analysis, demonstrate the demographic conditions surrounding the present day characteristics at the time the hazardous waste facilities were sited. It also reveals the effects of post-siting demographic change may or may not have caused.

In Los Angeles County, based on the results thus far, it is clear that there is some evidence of discriminatory siting throughout all decades. There is a difference in minority subgroup that is largely affected depending on decade. For Instance in the 1970s, the predominantly African American groups made up a majority of the demographics surrounding the hazardous waste facilities. By the end of the 1980s, less African Americans made up the regions proximate to the hazardous waste facilities and more Hispanic and foreign-born populations made up these regions. By the 1990s and 2000s it was evident that African American communities were no longer the choice target for the location of hazardous waste facilities in Los Angeles County. This demographic was replaced by an even more marginalized population, what we have termed the “Vulnerability Index 4” minority in a prior chapter of this dissertation—a minority with low socioeconomic status combined with high foreign-

born status. In latter years of discriminatory siting, namely 1980-2000, the Hispanic, non-English speaking, foreign-born populations became the predominant demographic in close proximity to the hazardous waste facilities. The African American population was extremely minimal surrounding facilities sited in 1976-1985 and 1986-1995. These results became even more pronounced in the recent decades.

The spatial maps from 1970-2000 for all of the facilities sited throughout different periods in Los Angeles County show clear trends of a decreasing African American concentration across the four decades and an increase in Hispanic and Asian concentration. The earlier facility sitings occurred in more African American concentrated tracts, however, latter facility sitings occurred in Hispanic homogenous tracts. Based on the spatial map analysis as well, it was observed that in conjunction to the discriminatory siting that occurred across each decade in Los Angeles County, there was a concurrent influx of Hispanic populations into tracts surrounding the hazardous waste facilities and an outflow of the African American population in latter years.

In conclusion there is reason to believe that in Los Angeles County the siting of TSDFs have been a result of discriminatory siting and not just a result of post-siting demographic change. Although we nothing is absolute and in most circumstances there is a more fluid interaction of several different phenomena happening at the same time, one point that can be concluded is that in Los Angeles County, the demographics surrounding the placement of hazardous waste facilities went from being predominantly Black to predominantly Hispanic. One must also take into

account the general decline of the African American population and the growth of the Hispanic and immigrant populations as a whole, but also consider that following the specific trends of these demographic changes through our analysis, the rate at which general growth happens is not in sync with the more rapid disproportionate demographic outcomes of certain populations surrounding the hazardous waste facilities.

There is reason to believe that these outcomes are due to the fact that Hispanics became the more marginalized minority subgroup. The cause of this development is likely multifactorial, but it can be hypothesized that Hispanics may have become an easier target perhaps because they may not have been as vociferous in the fight against the placement of these facilities in their neighborhoods. Another racial minority with no immigrant-laden characteristics like the African Americans may have an easier means to protest than did the Hispanics.

It is evident that some form of discriminatory siting existed in the placement of locally unwanted hazardous waste facilities in Los Angeles County. It is further important to look more intricately to the subgroup and non-assimilated foreign-born traits which can offer some more detailed insights and explanations of certain environmental justice issues in Los Angeles County.

The next chapter will be the conclusion chapter that will summarize the findings of the research and discuss both limitations and recommendations for further areas of research in this field of study.

CHAPTER NINE: CONCLUSION

This dissertation posed four major questions to be answered to add to the current research on environmental justice. Looking specifically at Los Angeles County, this research examined the following questions: (1) Do environmental inequalities exist in immigrant communities? (2) What characteristics of immigrant populations are associated with a greater likelihood of living near environmental hazards than native-born populations? (3) Do non-assimilated immigrant groups have characteristics that make them more socially marginalized than non-immigrant racial minorities or low-income populations, thereby increasing their likelihood of living close to environmental hazards? (4) Are environmental disparities in Los Angeles County a result of disproportionate siting or post siting demographic change?

These questions are particularly important because the existing research on environmental justice has been focused on explaining disproportionate environmental burdens by race, income and other socioeconomic factors. Little research had been done to examine the effects if any on specific immigrant characteristics that are not parts of the traditional analysis. While many studies to date have looked at and found minority and low income groups associated with the location of environmental hazards (e.g. GAO, 1983; Bullard, 1983, 1990; UCC 1987; Bryant and Mohai 1992; Mohai and Bryant, 1992; White, 1992; Hamilton, 1993; Zimmerman, 1993; Goldman and Fitton, 1994; Pollock and Vittas 1995; Been and Gupta 1997; Boer, Pastor, Sadd and Synder 1997; Stretesky and Hogan 1998;

Hunter 2000; Szasz and Mueser 2000; Pastor, Sadd and Hipp 2001; Saha and Mohai 2005; Taylor 2014), no study to date has put a large focus on immigrant characteristics—inability to speak the dominant English language, a lack of social/political capital due to foreign-born status, or other non-assimilation characteristics that further limit social capital and may cause an added level of marginalization to the already limiting characteristics of being a racial minority and poor.

In this specific study one of the first determinations made was to take the traditional racial classifications and create a clear typology based on the limiting characteristics that certain racial groups are likely to be marked by. In Los Angeles County it was found that African Americans are largely limited by low socioeconomic status but are not likely to be marked by much of the foreign-born limiting characteristics. African Americans are largely able to speak English well, have a low rate of foreign-borns and are largely “assimilated” minority groups.

Asians in Los Angeles County are the opposite of this. Asians are marked by relatively high socioeconomic status but also have high foreign-born status. Hispanics have both low socioeconomic status and high foreign-born status and are the least assimilated minority group in Los Angeles County. Non-Hispanic Whites, as expected, are of relatively high socioeconomic status and low foreign-born status in relation to the other racial/ethnic groups.

From these results we were further able to discover that in Los Angeles County, foreign-born residents are more likely to live near environmental hazards than are native-born residents. Non-English speaking populations and non-US citizens are also more likely to live near environmental hazards than are English-speaking

populations and US citizens. And that amongst the foreign-born populations, the groups marked by lower socioeconomic status with low income, working class occupations, and less education were more likely to live near environmental hazards than their higher socioeconomic counterparts. Among racial minorities this was the Hispanic population.

For this reason, we see that the Hispanics are by far more disproportionately burdened in Los Angeles County in comparison to all other races as a whole. An extension of this points to the fact that when looking at immigrant populations it is true that non-assimilated immigrant groups that are non-citizens and also do not speak English well or at all, are much more burdened by hazardous waste facilities in Los Angeles County in relation to just racial minorities or just socioeconomically depressed populations.

In Los Angeles County it is quite interesting to see that as of the 2000 census, the African American populations are not as marginalized as a racial minority in relation to the existing TSDFs as the Hispanic population. In fact, African Americans as a whole do not show disproportionate burdens based on hazardous waste facility siting in present day according to the 2000 census. However, based on the longitudinal data that was analyzed, it is evident that in earlier decades, especially in the 1970s (which is how far back our dataset goes), African Americans were the more racially discriminated groups than all other races with respect to disproportionate burden of hazardous waste facilities. African Americans are less disproportionately impacted by race in the 1980s. However in later years, especially by the 1990s and 2000s, more unassimilated immigrant groups—Hispanics emerged

and in some ways took over as the more marginalized racial/ethnic groups. By 2000 it is no longer primarily an African American problem in Los Angeles County. By this time it is very much a Hispanic and other non-assimilated immigrant group problem. This lends to the possible conclusion that there are in fact different and newer factors of limitations that go beyond just being a racial minority.

As in the case of the Hispanic, non-English speaking populations, there is a more marginalized group of people as they already are marked by the traditional low socioeconomic traits and are a racial minority, however on top of this, their inability to speak English or not being a citizen with the right to vote, or other immigrant laden characteristics can create an additional layer of limitation. From an industry perspective, in deciding where to locate a locally unwanted hazardous waste facility, it may become more attractive to target these more marginalized groups. In Los Angeles County, the results show that race does in fact play a predominant factor in the discriminatory siting of hazardous waste facilities in certain communities.

From the longitudinal study we are able to find that in the earlier decades (1970s), the African American population was the most marginalized group that was targeted in the siting of these waste facilities. In latter decades (1980-2000s) in Los Angeles County, low percentages of the black population made up the regions surrounding the waste facilities. Instead the disamenities shifted towards the Hispanic, non-assimilated foreign-born characteristic laden populations. Based on the results of the longitudinal study, the outcomes were not simply a result of post-siting demographic change, where there was a shifting of one racial group to another in a certain region. Hazardous waste facilities were sited in new regions that housed

a different, more marginalized group of people. In Los Angeles County this group was the Hispanic population and also a predominantly foreign-born and non-English speaking population.

Further analysis using the GIS maps of each decade against the siting of the facilities by groups shows that it is not simply just the result of the Hispanic population in Los Angeles, to move into the regions where a facility already existed. Hispanics are also not just moving into African American neighborhoods that were once hazardous waste facility laden. The analysis shows that in Los Angeles County, facilities sited in the 1966-1975 period, were sited in African American neighborhoods and facilities sited in latter decades, such as 1986-1995, were sited in Hispanic neighborhoods. In other words, the facilities sited in the first group 1966-1975 and the facilities sited in the last group, 1986-1995, were sited in completely distinct regions of Los Angeles County. The depictions shows that it was not simply the result of facilities moving into the same regions of Los Angeles County over the years that went through demographic change from one predominant race to another. In 1986-1995, the facilities were very clearly sited in predominantly Hispanic neighborhoods. These neighborhoods were always predominantly Hispanic, which grew to be even more highly concentrated Hispanic over the many decades, but this was not a region that was once predominantly African American that shifted to Hispanic over the course of many years and the result of just demographic neighborhood change.

With that said, the map analysis also shows that there are still very much natural shifts in the population in Los Angeles County happening at the same time. There is

an overall decrease in the African American population as a whole and an overall increase in the Hispanic and Asian populations. Due to the large growth of the Hispanic population, they have started to predominate in areas that were once African American dominated tracts. At the same time, African Americans have less tracts in 2000 that are predominantly African American versus that in the 1970s. The opposite phenomenon is observed with the Hispanics. Los Angeles County has very high concentrations of Hispanics in many of the tracts and these numbers are projected to grow. It is evident, however that in looking at the 1990 and 2000 maps, the newest two facilities were sited in a region that was almost wholly Hispanic (greater than 90%) and no other race. These regions were also marked by high concentrations of populations that were non-citizens that did not speak the English language well.

These results show that in Los Angeles County, there is clear evidence of discriminatory siting and not just post-siting demographic change. As in most neighborhoods underlying demographic change is occurring across all decades in Los Angeles County as well, however it is evident that there is some level of discriminatory siting that has occurred on all decades of hazardous waste facility siting.

9-1 Limitations

Los Angeles County is a very interesting region to study for reasons of great diversity and the fact that there are larger numbers of minority groups which make the sample sizes of these groups much more significant and interesting. With that said, this study does not go without limitations. Firstly, on a statistical level it was extremely difficult to deal with all of the multicollinearity issues due to the fact that Los Angeles County is so heavily Hispanic and this variable conflicts with so many of the other socioeconomic and immigrant variables. Also because the US census is tract level data, it is difficult to analyze the individual level affects of various variables in question. In future studies it might be useful to utilize a different longitudinal dataset that may allow access to individual level data across various years.

Another major limitation that this dissertation had was the fact that after the 2000 census, more updated 2010 US Census changed its format and decided to obtain only short form questionnaires from the general population pool instead of the long form, which contained all of the interesting foreign-born, immigrant and multi-ethnic interaction level data. Instead of the larger 2010 Census survey, the US census moved all of the immigrant and more in depth socioeconomic variables to the American Community Survey. This is a survey taken yearly and available in the form of up to 5-year groups. Because of the different nature of these data sets, it becomes much more difficult to longitudinally compare all of the socioeconomic and immigrant variables that are critical to this study. In order to target this problem future research should be conducted in which we can best normalize the 2010 data to that of the preceding decades used in prior studies. Perhaps another method of

targeting this problem would be to re-analyze the data with the 2010 census as a starting point and working backwards. In this way we may be able to use a consistent combination of the decennial census in conjunction with the American Community Survey data for all prior years of interest. Also, in using the census dataset, there is really no way for us to be able to do any research on unauthorized, undocumented immigrants, which can be sizable in Los Angeles County.

The other limitation for the study comes from the fact that no matter what, the census data will always have limitations because the data is collected at a tract or block group level and is not individual level data. Due to this, we cannot make certain individual level conclusions of any of the research questions. In a study such as this where we seek to answer questions relating to a certain populations and the effects of certain disamenities on a given population, individual level would be a huge plus. Also, when looking at issues of the chicken or egg question such as this, a completely different approach of a qualitative study may have been helpful. Surveying a sample in the location of interest may offer some interesting answers to the questions that a purely quantitative methodology may not be able to capture.

9-2 Final Thoughts and Recommendations

The overall results that were found from this dissertation research offer some interesting new insights into the world of environmental justice by combining more in depth racial subgroup related data as well as aspects related to the non-assimilated immigrant population. These elements were not reflective of any past studies in this discipline and in many ways the results thus far pave an interesting starting point to continue this study at a deeper level. For one, it would be interesting to see what

sorts of results different datasets may allow, for instance, individual level longitudinal data sets. Also, it would be interesting to see what results would come from a more expansive area of analysis. This would be research that would cover not just Los Angeles County, but perhaps at a state level such as California as a whole or looking at other counties and states throughout the United States. As an extension to this, it would be interesting to target regions across the United States that have enclaves of certain ethnic groups of interest. For instance it would be interesting to look at regions with large subgroups of black immigrants that may also be laden with non-assimilated immigrant characteristics. Another interesting group of study would be to examine non-immigrant Hispanic groups that are not laden with such non-assimilated immigrant characteristics. It may also be interesting to see what sorts of results can be derived from a national level study which would offer a more expansive view of the universe.

Another recommendation would be to incorporate later decades of the census for all the subsequent years to come and possibly even employ other methods of research. In this regard it may be interesting to add a more qualitative study or incorporate a research plan that includes surveys of the target demographic of interest. Lastly it may be interesting to do more research by implementing other forms of media such as a video. It would be interesting to create a documentary type of film covering the main points of this and other related research of this discipline. This would allow the outcomes of related research and discipline overall to have a more broad reach to a wider, newer audience potentially across cultures and languages.

In order to bring some tangible, real life perspective to this dissertation study, a visit to some of the most polluted hazardous waste facilities in Los Angeles was made. Four of the largest TSDFs in Los Angeles County were visited and the surrounding neighborhoods were observed. Many disturbing observations were made, including the fact that some of these hazardous waste facilities existed right in the middle of densely populated neighborhoods. Preschools and primary schools, parks and residential complexes were in close proximity, just minutes away from these toxic pollutants. In the appendix, the photos that were taken during this time were compiled into a short photo essay depicting what was observed.

APPENDIX: PHOTO ESSAY

CLEAN HARBORS

Figure A-1 Clean Harbors' facility



Figure A-2 The only sign at Clean Harbors that warns the public of hazardous materials



Figure A-3 Spanish signage indicating homogenous Hispanic population next to Clean Harbors' facility



Figure A-4 Elementary school four blocks away from Clean Harbors' facility



EVOQUA WATER TECHNOLOGIES

Figure A-5 Elementary school three blocks from Evoqua Water Technologies



Figure A-6 Preschool three blocks from Evoqua Water Technologies



Figure A-7 One of the largest food banks in Los Angeles is across the street from Evoqua Water Technologies



Figure A-8 Evoqua is located in a homogenous Hispanic neighborhood next to popular restaurants and establishments



PACIFIC RESOURCE & RECOVERY

Figure A-9 Pacific Resource & Recovery's facility has misleading signage that indicates it's a paint company



Figure A-10 The only sign indicating hazardous materials is behind the building hidden among many other signs



Figure A-11 Housing projects four blocks away from PR&R that houses predominately hispanic families



Figure A-12 More Hispanic Signage across the street from PR&R



Figure A-13 A youth center that is located three blocks from PR&R



Figure A-14 A children's baseball field located three blocks from PR&R



DK ENVIROMENTAL

Figure A-15 Their name purposely makes DK Environmental sound like a recycling plant



Figure A-16 Tucked away in a nondescript alley along the perimeter of the facility are the hazardous waste signs for DK Environmental



Figure A-17 The employee picnic area on the grounds of DK Environmental



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